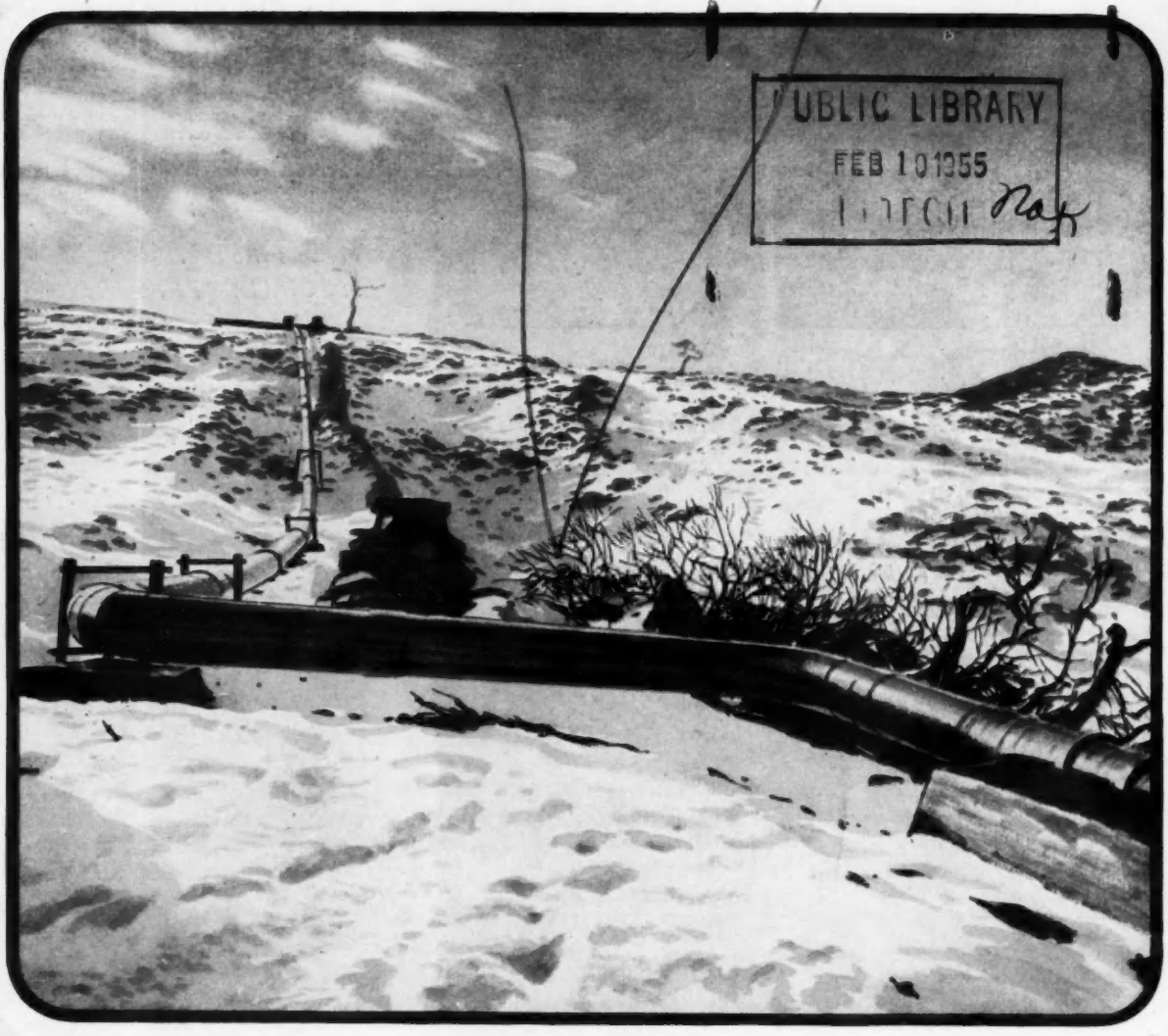
ECHNOLOGY DEPT.

Gas Journal

VOL. 281. 107th YEAR. LONDON, JANUARY 26, 1955. No. 4782. PRICE 1/3



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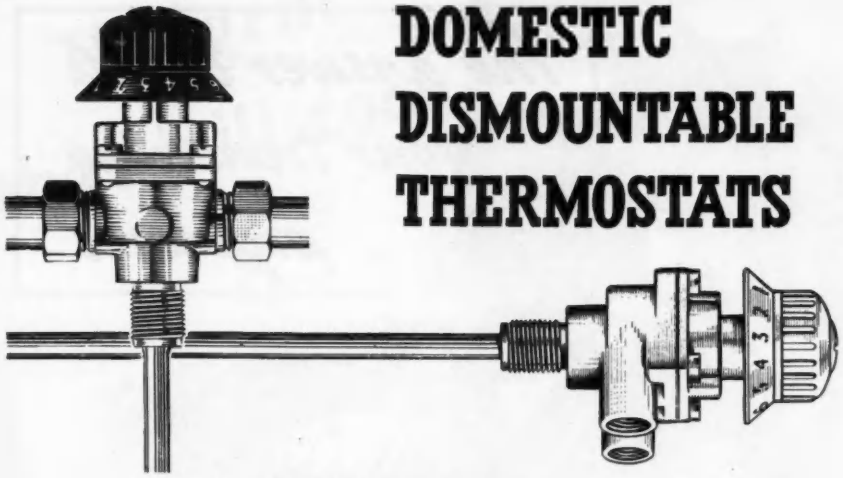

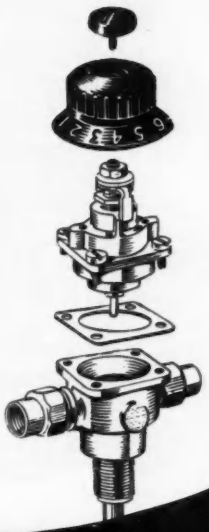

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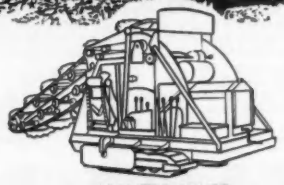

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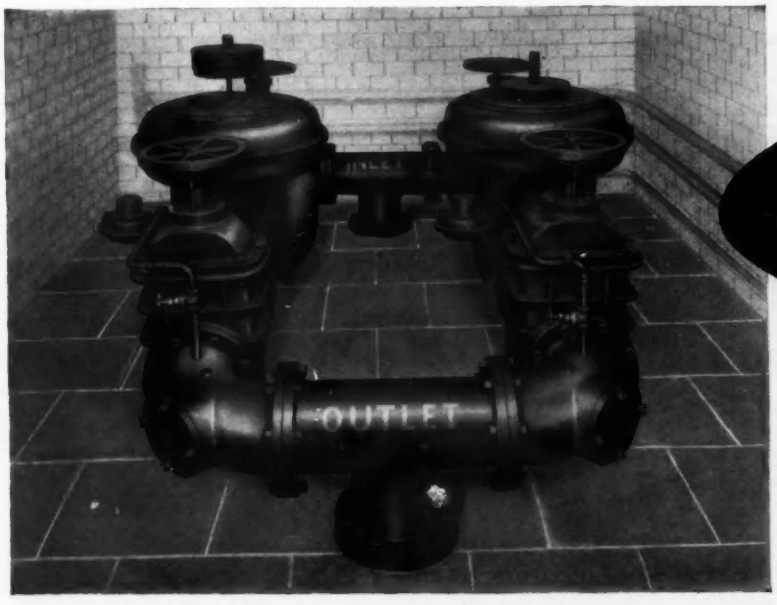

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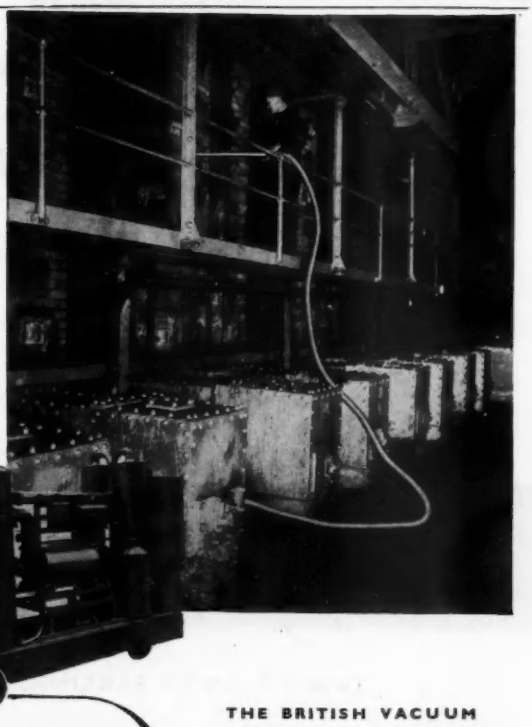

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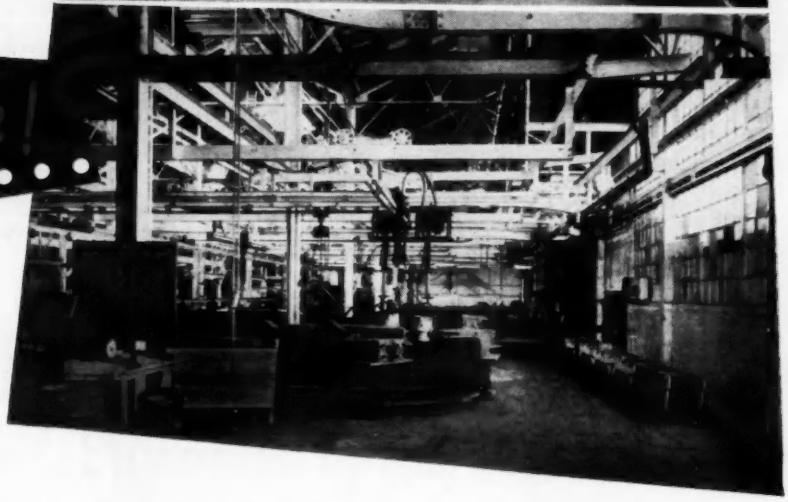

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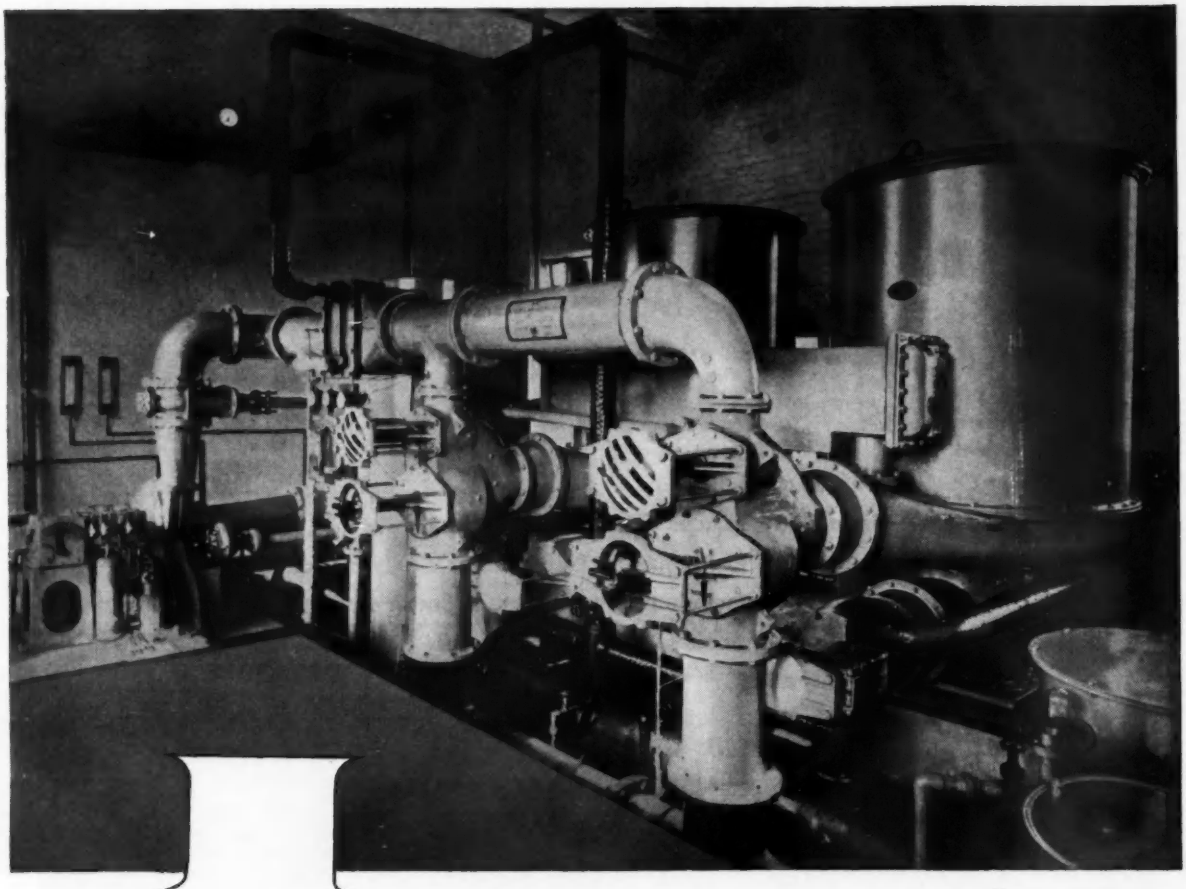

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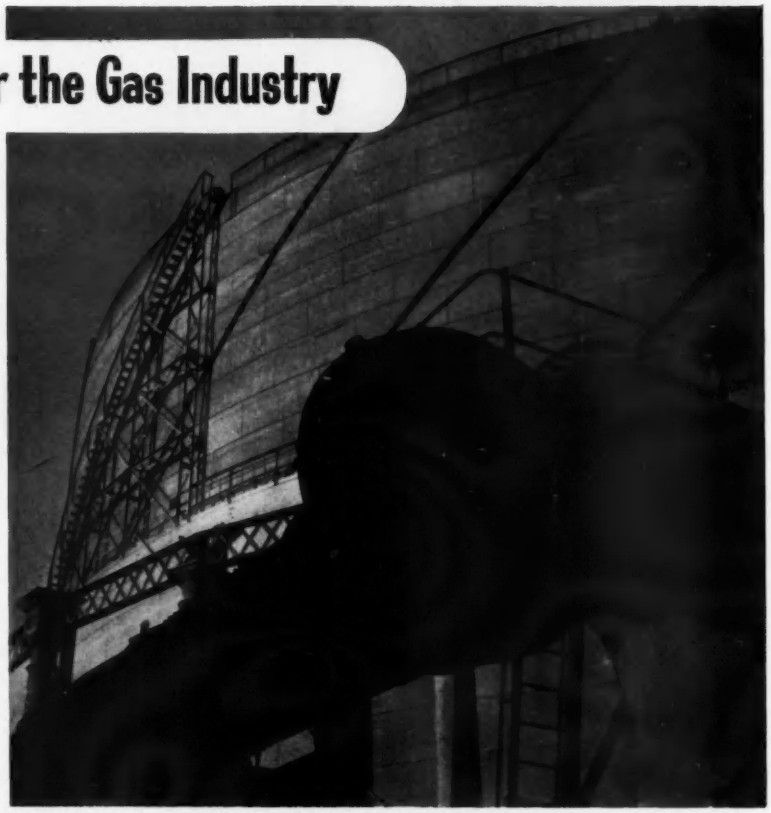

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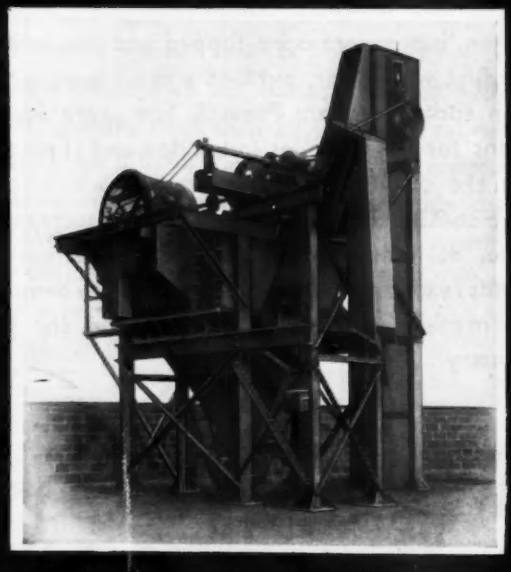

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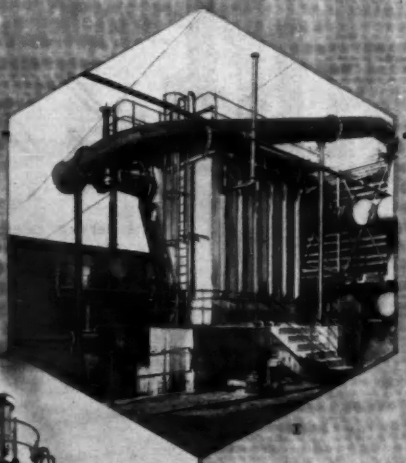

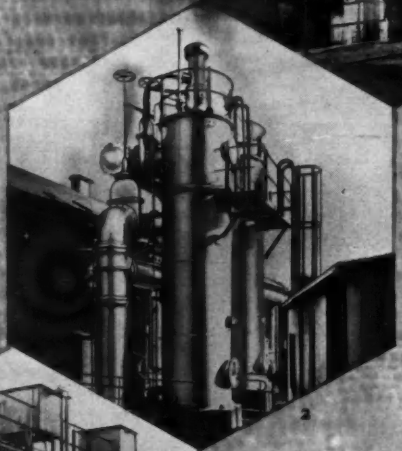

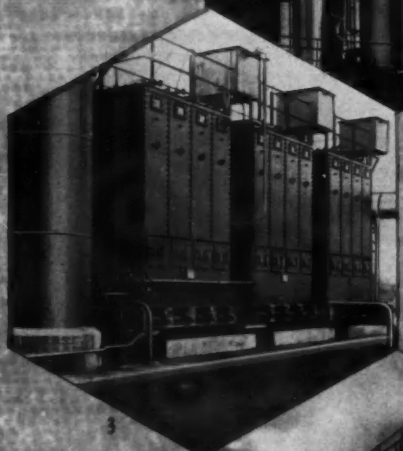

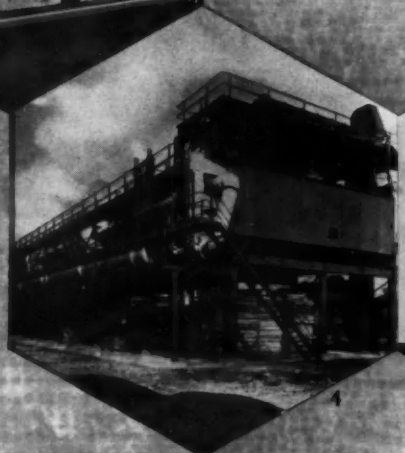

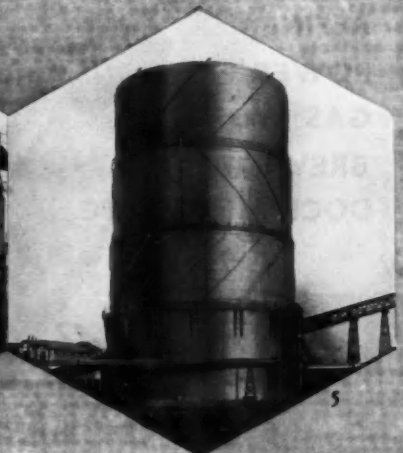

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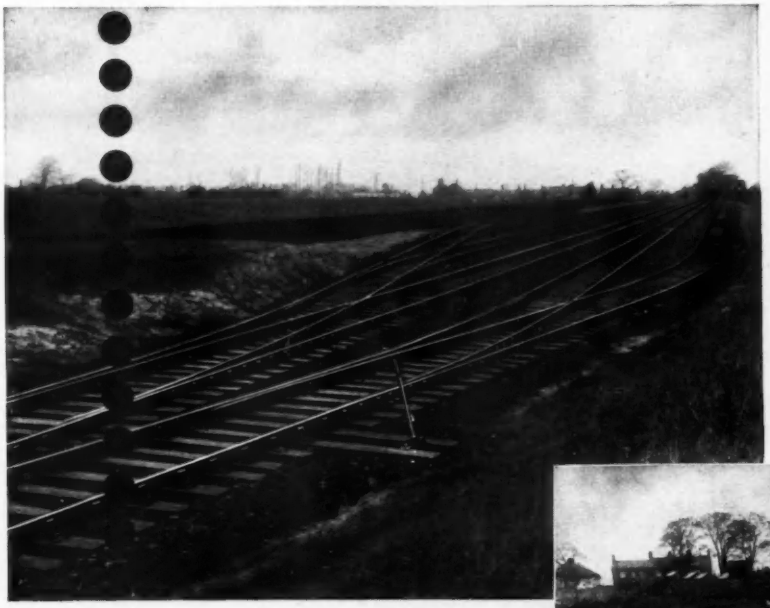

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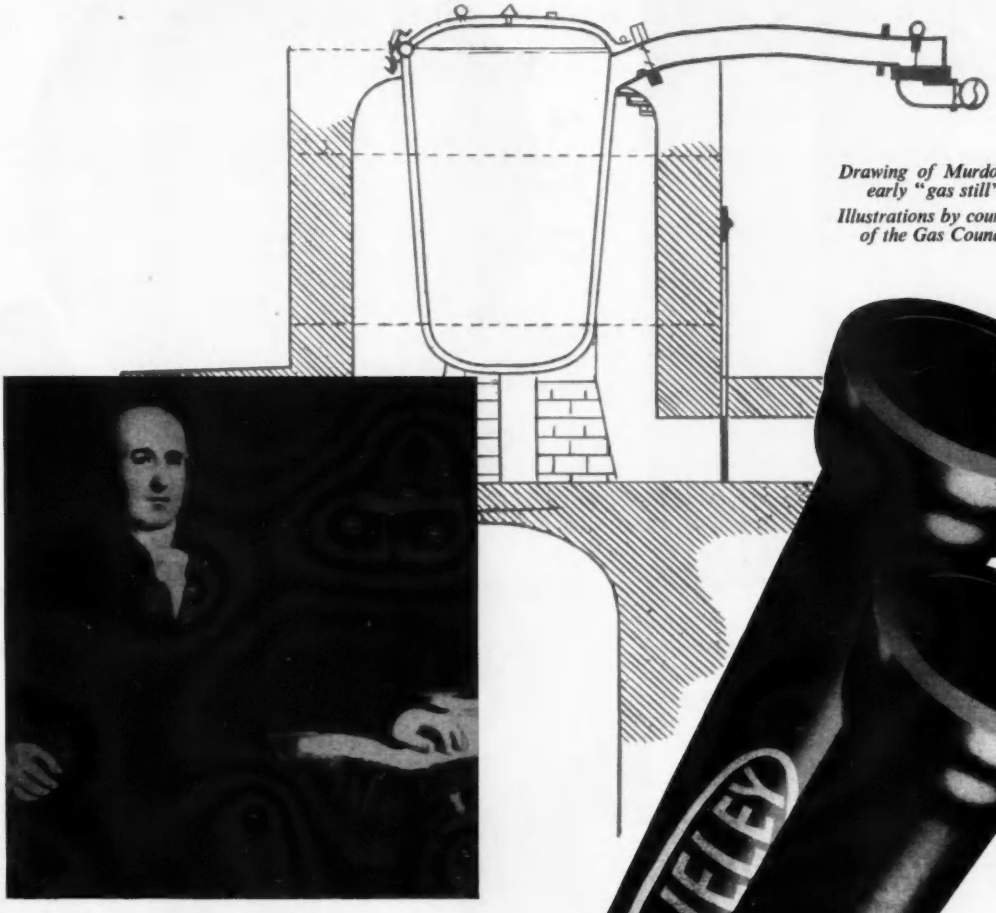

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Illustrations by courtesy of the Gas Council

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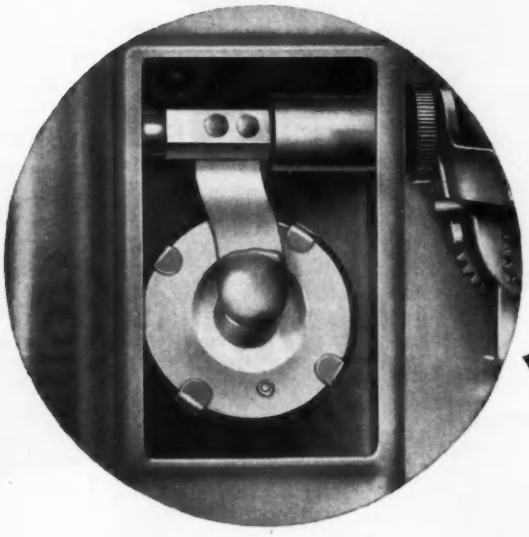

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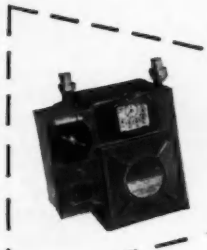

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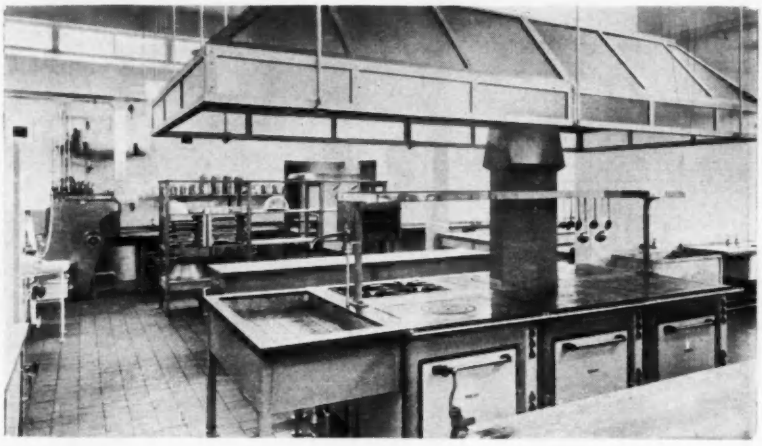

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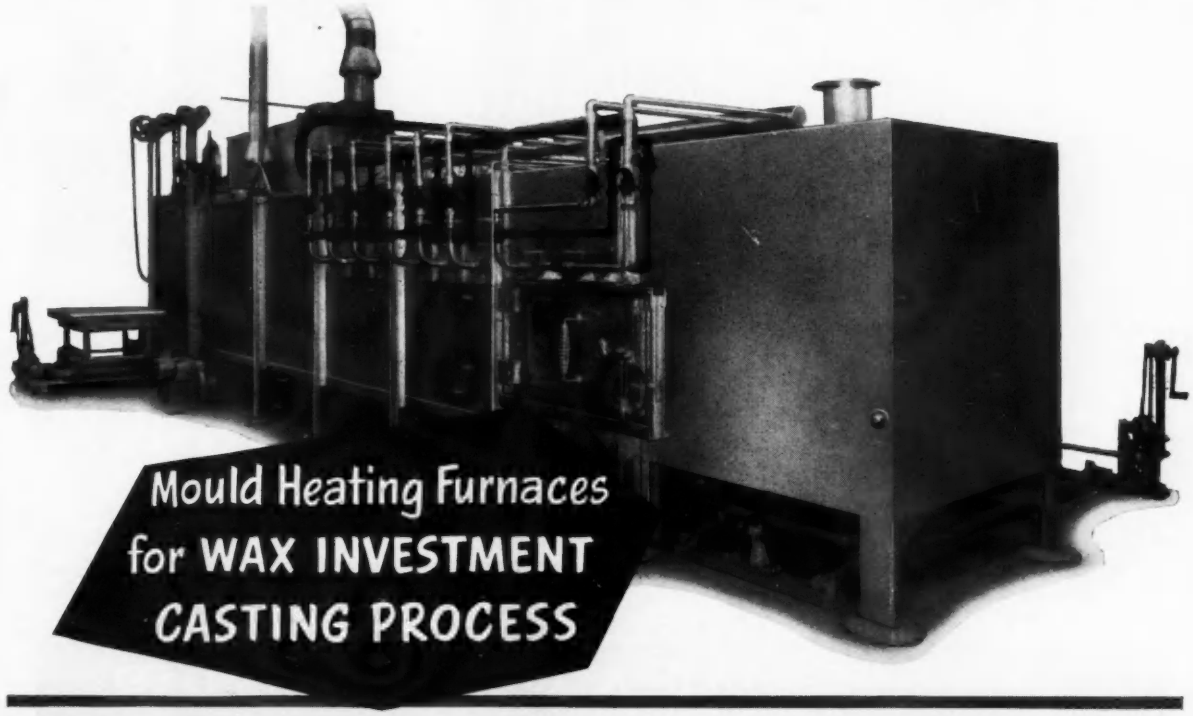

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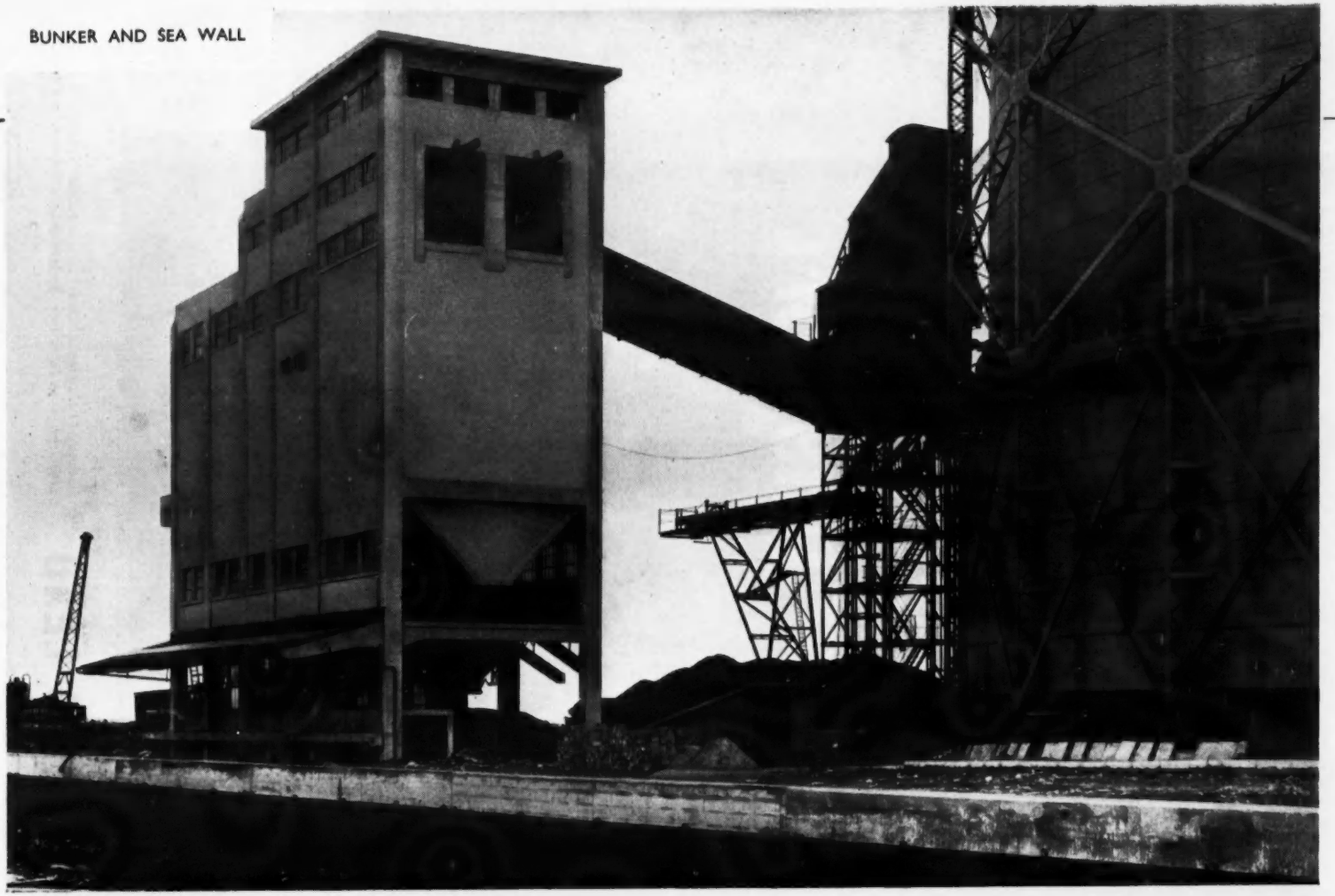

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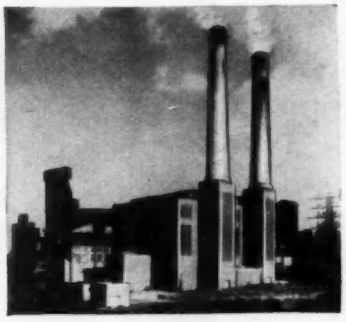

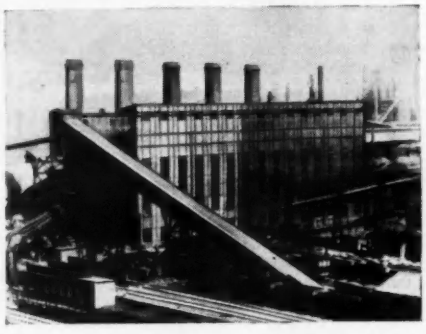

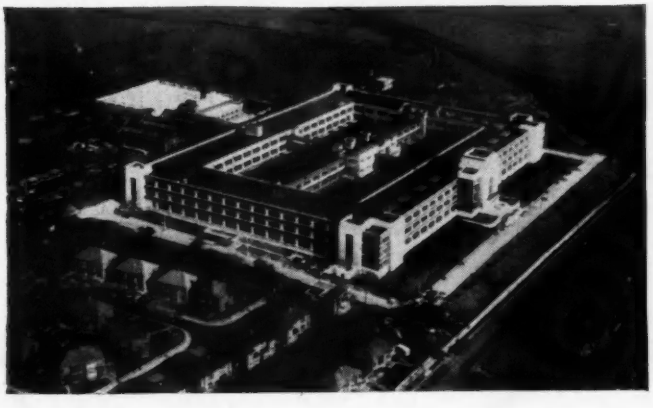

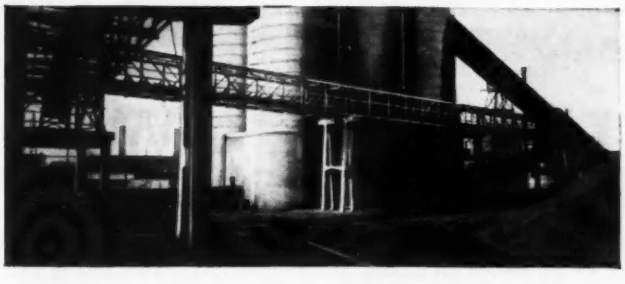

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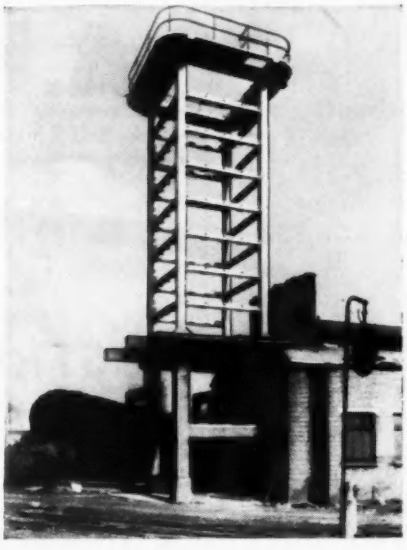

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Portrait of a harassed metal-trapper

now made extinct by the

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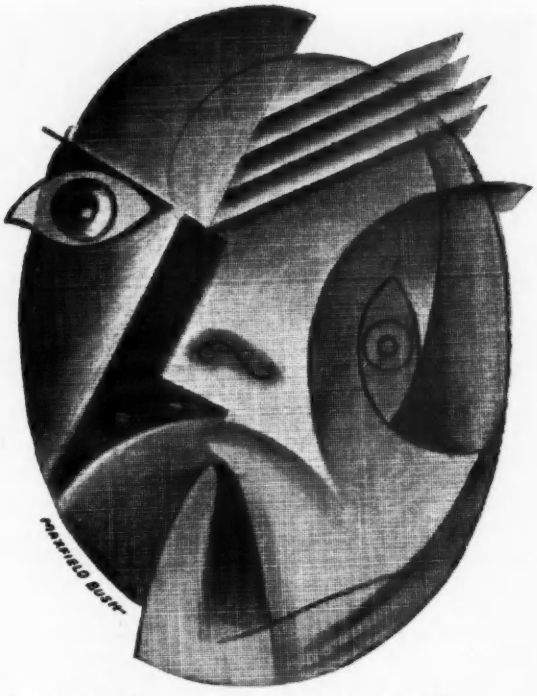

If only his methods had been as futuristic as his portrait, he wouldn't be wearing that anxious look. Nowadays, of course, nobody need get worried about locating lost pipes, covers etc. you just leave it to the Cintel Portable Metal Detector.

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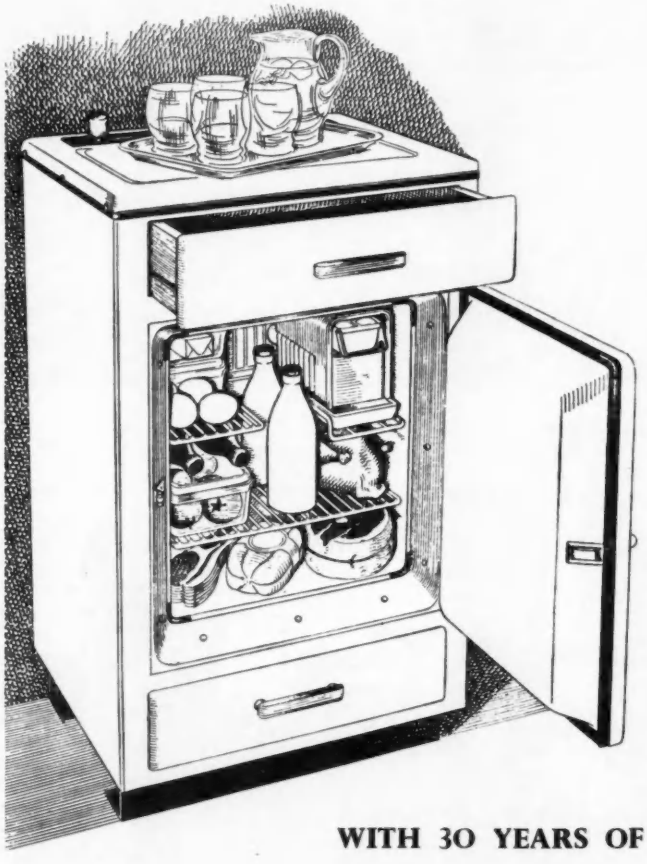
MR. THERM SAYS—

There's an 'R' in the month!



. . . **'R'** for *Refrigerator* sales *every* month . . . yet, once upon a time, months with an **'R'** were thought out of season for selling refrigerators.

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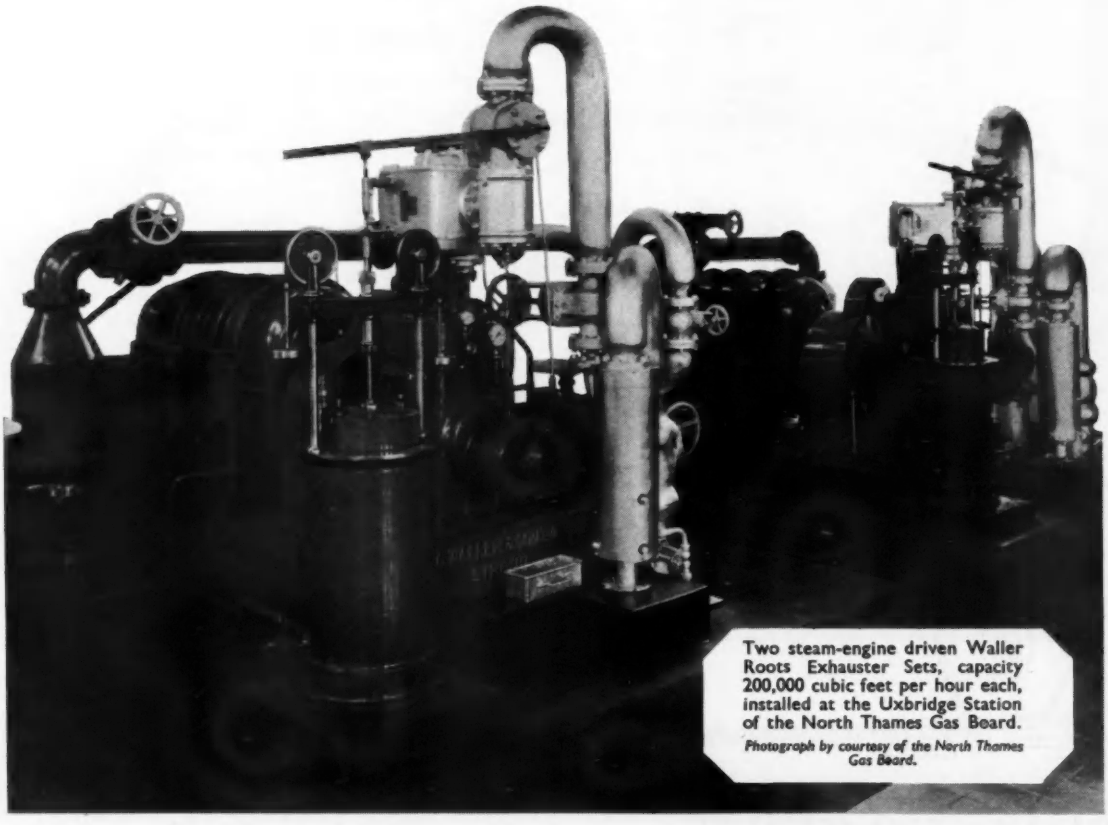
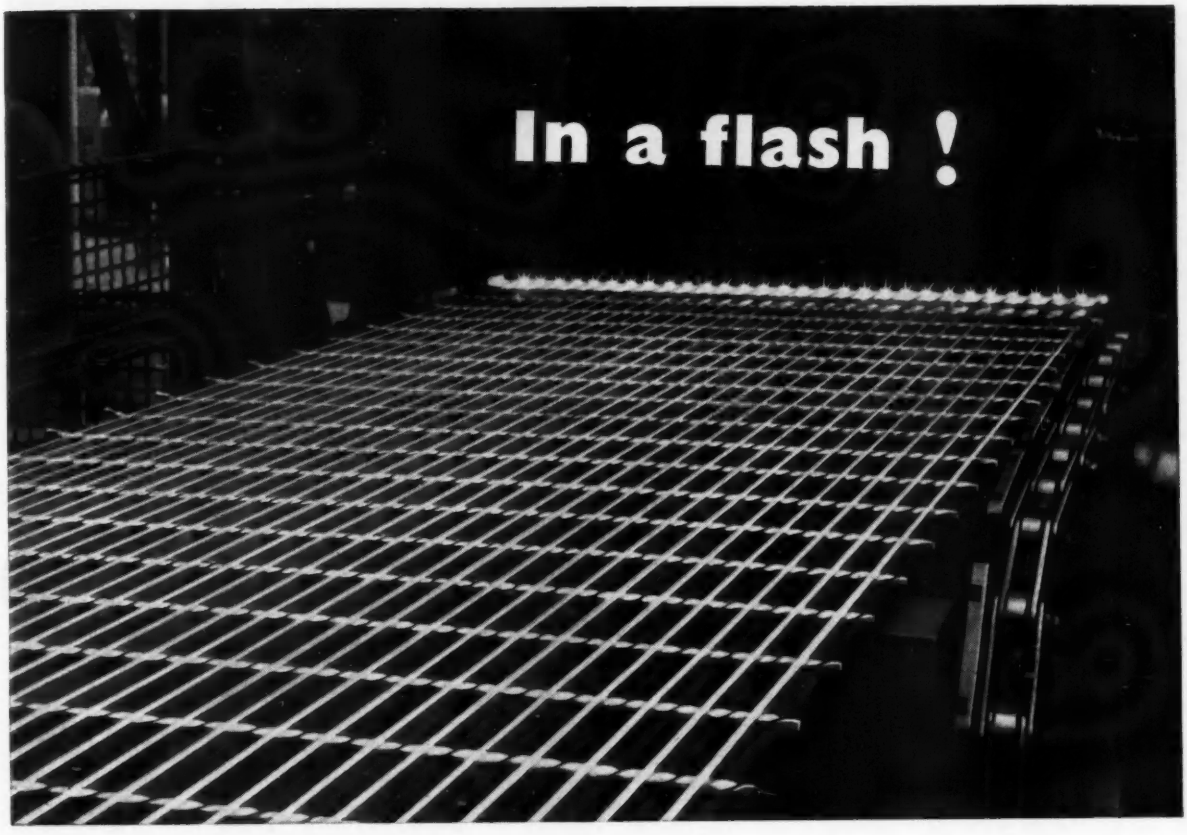


Two steam-engine driven Waller Roots Exhauster Sets, capacity 200,000 cubic feet per hour each, installed at the Uxbridge Station of the North Thames Gas Board.

Photograph by courtesy of the North Thames Gas Board.



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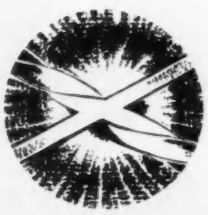
FLOWFORGE offers advantages in strength, in weight . . . and in PRICE. It will be to your advantage to send for details at once.



Send for publication No. 181 which gives fuller details.

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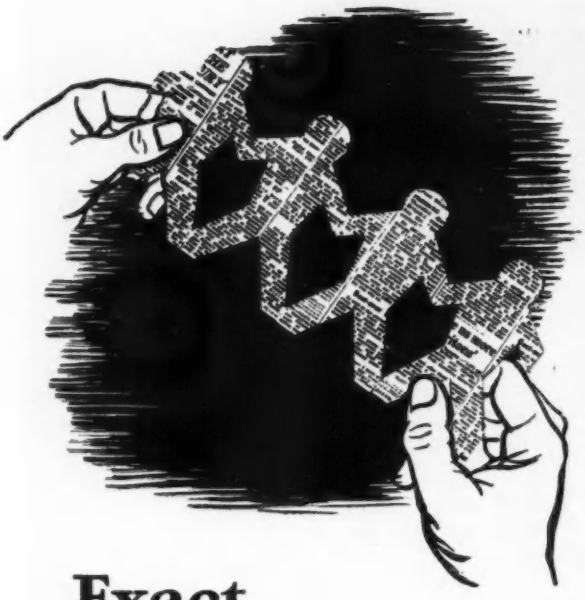
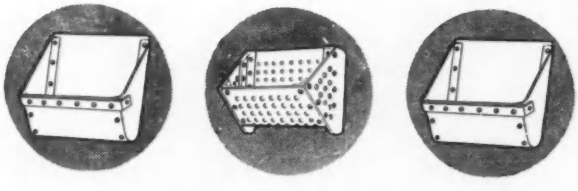


Exact Duplication . . .

If we had idle moments, then they might be spent in this way. At the moment, our preoccupation is concerned exclusively with the Exact Duplication of Elevator Buckets—we may be biased, but we find the results of our handiwork just as decorative, pleasurable and a *perfect* creative outlet.



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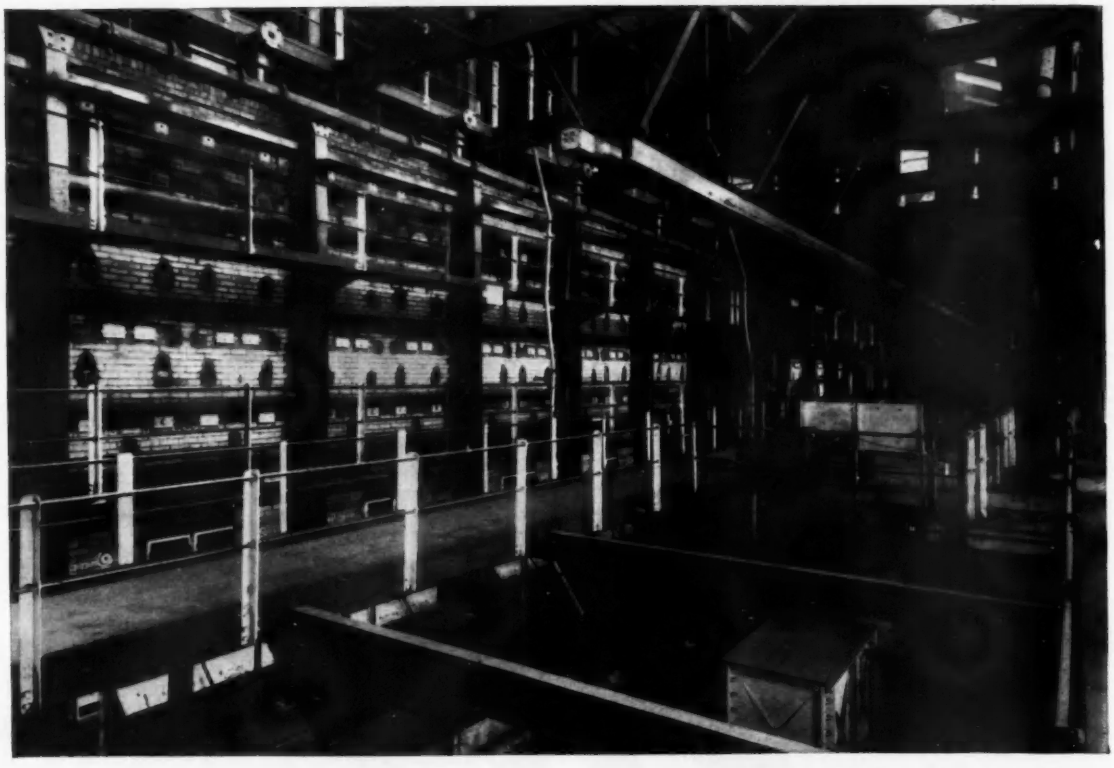

Unretouched photograph published by the courtesy of the North Western Gas Board.

View showing the two Benches of 6 Settings of 4 Retorts. C.O. Main can be seen in the foreground.

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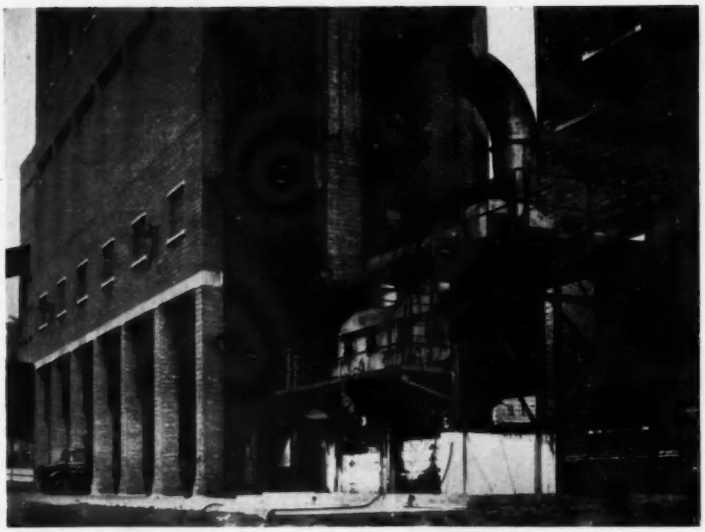

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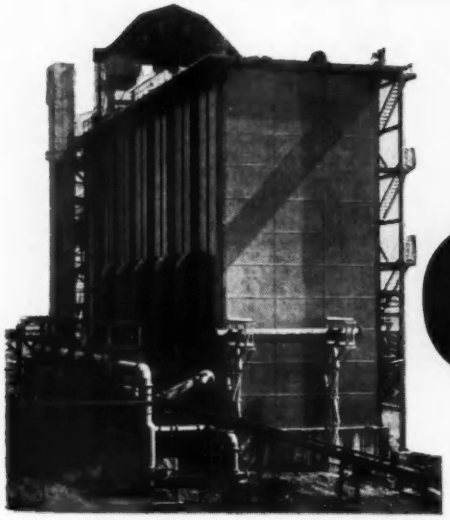
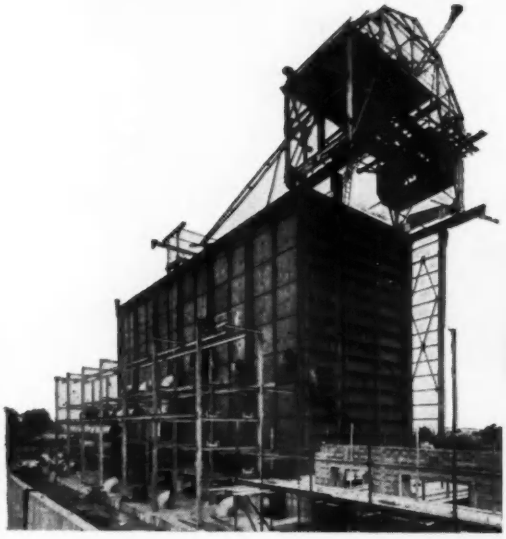
These Tower Box Purifiers are going up



One

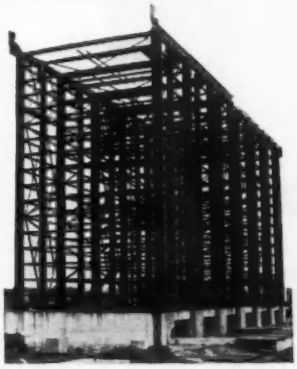
The first large Balfour-Lecocq Tower Box Purifier was completed at Rotherham. Its capacity soon to be doubled to 20,000,000 cu. ft. per day. A second purifier of 7,500,000 cu. ft. per day nears completion at Southall. The foundations are laid for a third at Bow Common.

The main reasons for the ready adoption of the Tower Box purifier are because it has fool-proof jointing between trays, and is fully mechanised. By adoption of special arrangement of connections the changeover of Towers can be effected easily in a few minutes.



After

The unequalled technical resources of the Balfour organisation are at the service of those requiring detailed information on application of Tower Box purifiers or other gas equipment to their needs.



Another

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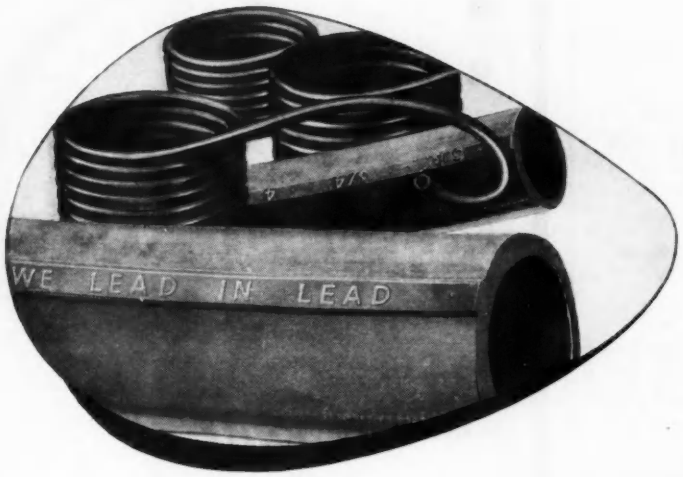

LEAD

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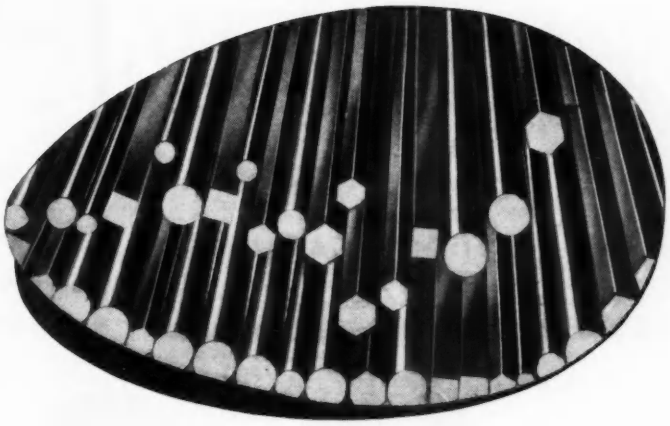

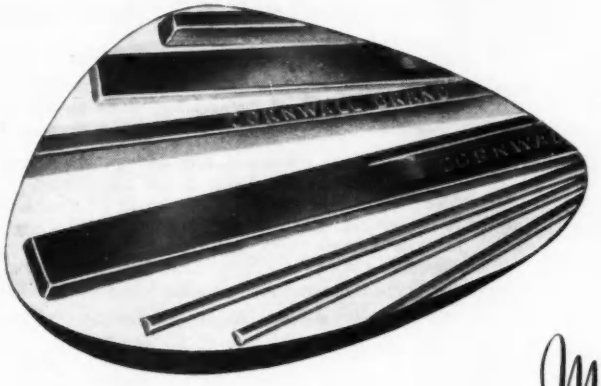

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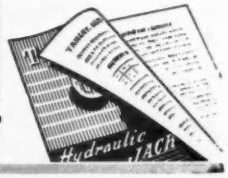
625	25	32	6	11·5
650	50	61	6	13
1215	15	38	12	18·25
1225	25	53	12	18·875



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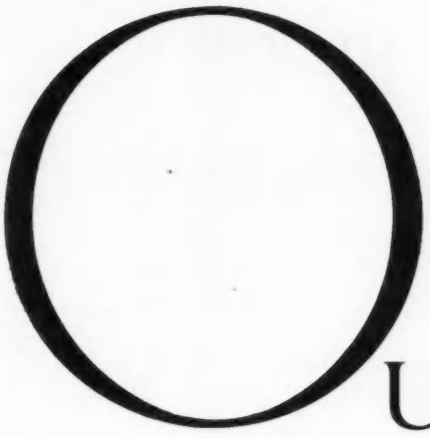

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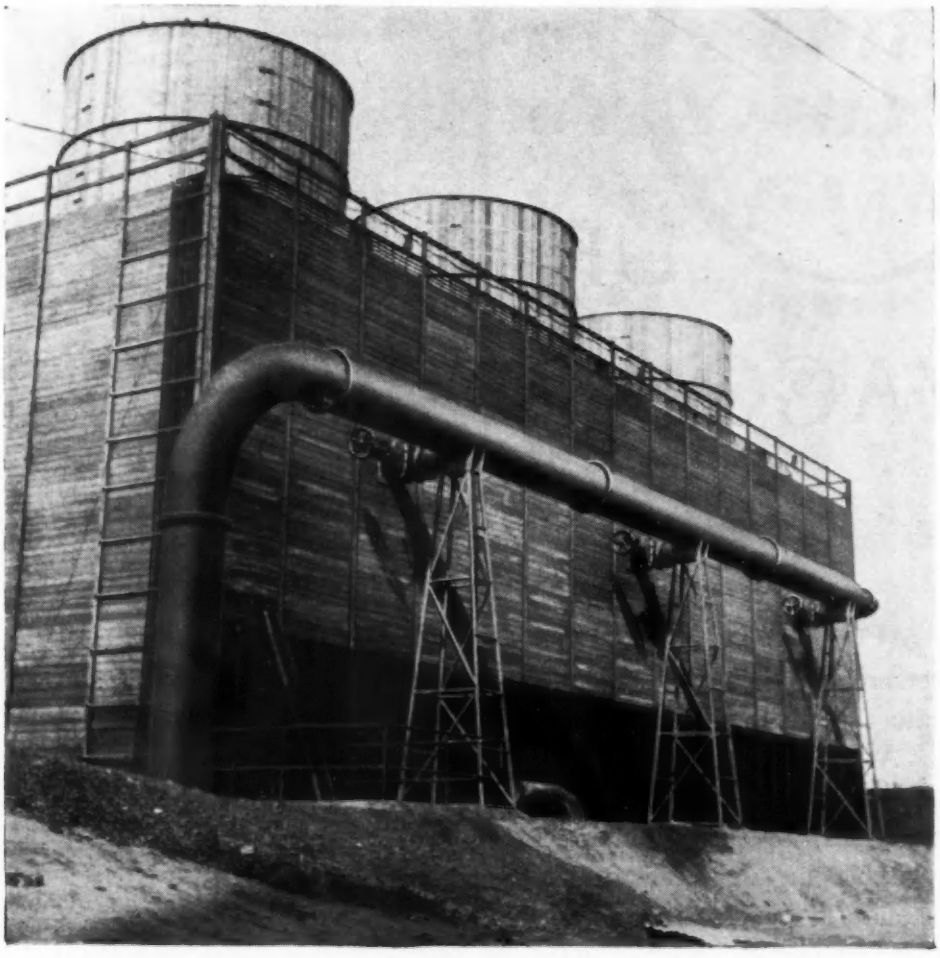

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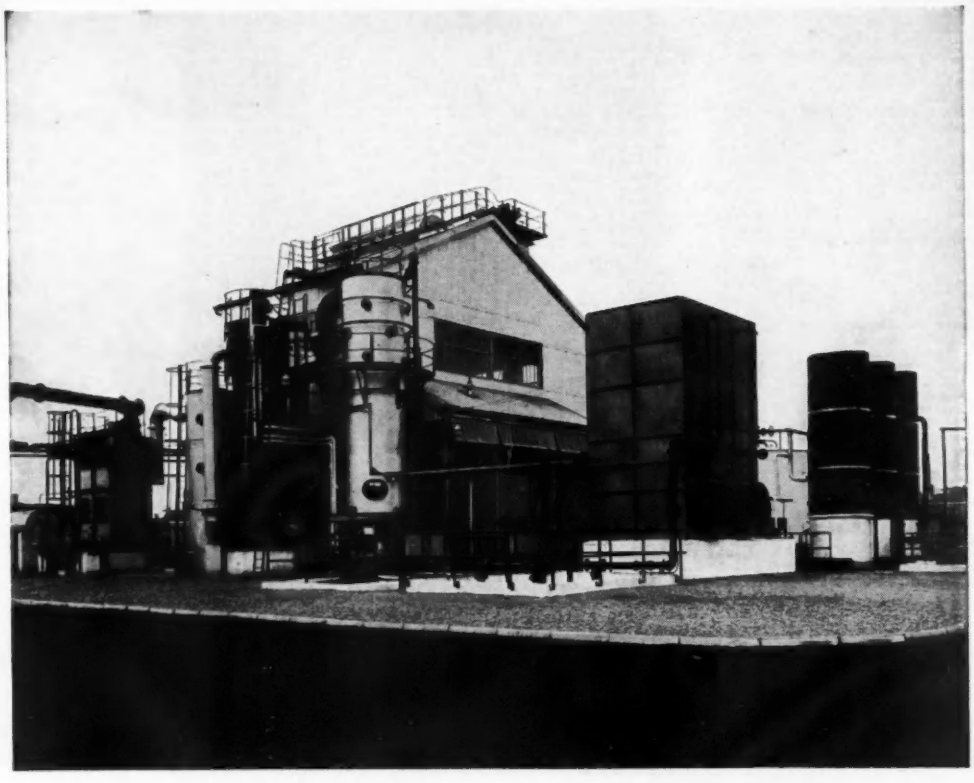

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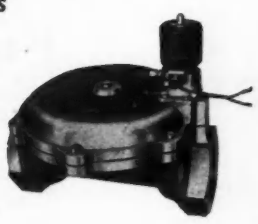

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Gas Journal

VOL. 281 NO. 4782 JANUARY 26, 1955

107TH YEAR

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DEPUTY EDITOR: Arthur C. Cross

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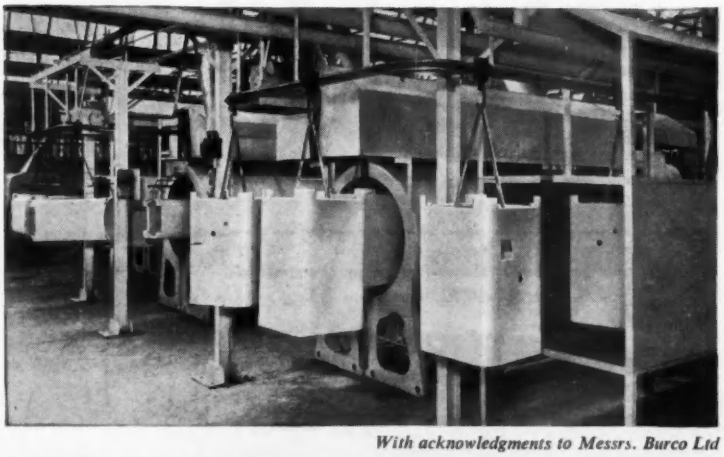

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Gas Journal

VOLUME 281. No. 4782. JANUARY 26, 1955. 107th YEAR

The Coal Situation

THE visit of the London and Southern Junior Gas Association to two collieries in the Midlands last Thursday (see pp. 239 and 249) and some recent pronouncements by two of the chief officials of the National Coal Board, prompt us to consider the British coal industry as it is today and as it affects the gas industry. Generally speaking it is a sombre story. We were promised that by 1960 we should have available 240 mill. tons of British coal per annum. In some quarters it was estimated that at the present rate of growth of productivity we should need 260 mill. We are now promised 250 mill. per annum by 1965. Sir Hubert Houldsworth in his annual review of performance of the National Coal Board for 1954 reported an increase for the year of no more than 0.27 mill. tons, making a total for the year of 223.79 mill. The output per man-year at 302 tons was 'the best since nationalisation with the exception of 1951, and if allowance is made for the additional week's holiday' (for the Coronation), 'is the best since before the war,' while both overall productivity and output per man-shift at the coal face were 'higher than ever before.' No doubt this increase in productivity is the effect of the considerable amount of money expended. 'Capital expenditure on the collieries themselves was about £67 mill. in 1954, compared with £57 mill. in 1953.' More is promised: 'an even higher investment rate in the coming year.' But, alas—manpower continues to fall away. 'The average number of men at work in the industry was 5,700 less than in 1953 (2,400 less at the coal face).' There are some saving features, even in this apparently almost intractable problem of manpower. Two areas show rises. It is hoped that a publicity campaign launched in the autumn will yield results. Reorganization of underground haulage has resulted in the release of 13,000 men from this work between 1947 and 1954, 'although the annual output handled has increased by approximately 27 mill. tons.' Absenteeism still stands at 12%.

Coal preparation shows a brighter picture. Substantial progress has been made or projected. Since Vesting Day washery capacity has been increased by 40 mill. tons per annum, and 65 more plants are under construction or in the design stage to treat a further 40 mill. tons. Increase in cleaning, however, leads to higher discard, 10 out of every 100 tons raised in 1954 against 6 in 1946, a point to be remembered in comparing saleable output of the different years. In later pages of this issue Sir Hubert Houldsworth, Chairman of the National Coal Board, explains the problems which the coal industry has to face, and in extracts from his recent Cadman Lecture to the Royal Society of Arts, Dr. Idris Jones, Director-General of Research to the Coal Board, outlines some aspects of the industry's research programme.

On the whole it cannot be said that the prospects are good for the realization of an annual output of 250 mill. tons by 1965. Mr. K. T. Spencer, the new Chief Scientist to the Ministry of Fuel and Power, put 'the aim' at 260 mill. tons in the period 1961-65. Mr. Spencer's paper on 'Fuel—its Availability and Efficient Use,' which we reported in our issue of January 12, will have been read with close attention. Not that he announced any fresh facts, but because here and there he brought a new view to the question. There was, for instance, the statement that 'apart from the fluctuations caused by two world wars, the total consumption of energy per head of population in Great Britain has remained relatively static for 50 years or more. As industrialization has proceeded apace the coal requirements of industry have steadily grown and, with coal production declining, these requirements have been met so far by increasing efficiency of utilization, by reducing exports and by increasing the use of oil.' And, it might have been added, by some import of coal.

It is usual to compare our energy consumption with that of the United States, with the suggestion that we ought to come up to their level in this respect. Mr. Spencer utters a sane criticism of this proposition. This high rate of energy consumption is, he admits, 'the main factor in the rapid emergence of the United States as the leading industrial nation and in its high standard of living.' But whether this is in the long-term interests of the United States is, he says, open to doubt, though it does determine the level of industrial production with which we have to compete. There is here, we think, a suggestion that it is not, in the long run, an altogether good policy to burn up your irreplacable assets as quickly as you can.

Mr. Spencer went on to discuss the means of filling the gap in our own economy between coal production and coal requirements, in the immediate future. This ground has been so frequently worked over recently that it is not surprising that he has nothing very new to say. We think we may infer from his remarks that

he agrees with the view that, 'for at least the next ten years,' we shall be lucky if nuclear energy makes up for the growing shortage of coal for electricity generation, although he does not say just that.

The gas industry, he tells us, as we have been told before, 'is exploring methods of making gas without the use of coal.' This seems to us to be an oblique presentation of the fact that the gas industry is endeavouring to meet peak demands by the use of oil gas. There is a curious slant, too, in the statement that, while 'the electricity and gas industries are of necessity conscious of their own interests in using coal to its maximum advantage, in the case of the gas industry, a fair account of its progress has not been attempted, since no account has been taken of coke and byproducts.' We wonder what that might mean. Nothing whatever was said, it should be noted, of the continual misuse of gas- and coke-making coals for direct combustion instead of in the vastly more efficient carbonizing processes.

In the long run we should always be on our guard against the cheerful view that when one or other of our natural resources approaches exhaustion, 'something always turns up.' Sir Charles Darwin in a recent letter to *The Times* addressed himself to the castigation of this form of cheerful optimism. Lord Simon of Wythenshawe has pointed out that some resources are being so rapidly used up that 'it is not a question merely concerning the far distant future, but rather the question is how much many of the younger people now living will have their standards of life materially lowered by these shortages.'

This important correspondence, still going on, is concerned wtih the vast and formidable problem of providing food and amenities for a rapidly growing world population. Sir Charles Darwin's views are to be found summed up in his recent little book 'The Next Million Years' which is worthy of a place on the fuel technologist's shelf.

The point to be grasped here and now is that we still call urgently for a carefully worked-out overall policy for the allocation and utilization of our dwindling coal supplies—and we see no sign of any such policy materializing. It is to be hoped that fuel shortages may be relieved by the use of atomic energy; but we may accept Professor Darwin's view that 'though this looks promising, it will certainly take time to develop and there may well be a close race between this development and the exhaustion of our oil and coal.'

JOINT CONSULTATION IN THE SOUTH EAST

AN interesting demonstration of joint consultation in action occurred on December 6 at Croydon when officials of the South Eastern Gas Board and members of the Joint Consultative Committees met to review the fifth year of the Board's activities. The proceedings, which comprised a morning and afternoon session, were opened by Mr. W. K. Hutchison, Chairman of the Board, and covered practically all aspects of the Board's activities.

A full report of this meeting has been recorded and published in a well-produced booklet which has been issued by the South Eastern Gas Board for the use of Consultative Committees. 'Joint Consultation' is the title of the booklet and in case this awesome name might be thought likely to frighten some committee members off studying it, we would add that the presentation is such as to make the report both interesting and readable. Photographs taken at the meeting have been skilfully used to lighten the text and to add that leavening of personal interest that makes such a difference. Apart from the 'human angle' the booklet contains a great deal of unusually interesting information about the South Eastern Gas Board and its work, its problems and the means by which is proposes to solve them. No doubt the facts and figures given account for the embargo placed on the general publication of the statistics contained in the booklet.

All of which underlines an important fact—that it is quite usual nowadays for employees to be taken into the confidence of management in a manner which would not have been dreamed possible 20 years ago. In this case, for instance, the meeting included an opening speech from the Chairman of the South Eastern Gas Board, an exposition of the Board's Twelve Year Plan for production and distribution by the Chief Engineer, a survey of the appliances sold and fitted during the year under review by the Deputy Commercial Manager and a description of the main features of the year's accounts by the Chief Accountant—altogether a pretty frank disclosure of the inner workings of the Board's machinery. Clearly the Board takes the view, and quite rightly, that if the men understand what is going on and why, they will identify themselves more closely with the aims and purposes of the Board.

The realistic approach to joint consultation was summed up by Mr. C. T. Price, Engineer, East Surrey Division, in his speech entitled 'Joint Consultation in the Gas Industry', when he said, 'It is undoubtedly somewhat difficult for management to "step down to consult," after a century or so of autonomous control. Nevertheless, the nationalised industries are committed to this form of administration. Let me add further that there is no halfway method of approach; one has to believe in it. It is all or nothing, and this applies to both sides of the table. Except when dealing with executive proposals which fall outside the scope of consultation, the various departments will benefit to an enormous degree, providing the employee is willing to co-operate and assist in solving the many problems which confront the management every day.'

BON VIVEUR JOINS MR. THERM

A SERIES of cookery demonstrations with a difference is to be held in the areas of the 12 gas boards during the coming year. Sponsored by the Gas Council, the demonstrations will feature Bon Viveur, the famous partnership of John and Phyllis Craddock, who are well known for their unique cookery presentations and their books on food and wines. They have an international reputation and are a recognized authority both on the imaginative and practical aspects of cookery. During the demonstrations all cooking will be by gas and the latest equipment will be used. Home service advisers will assist Bon Viveur.

The first of these special demonstrations will take place in the North Thames area at the Kursaal, Southend-on-Sea, on February 3. The programme is an exciting one, in which the audience will see special dishes prepared and cooked. They will also have an opportunity of sampling these, and of asking questions; copies of the recipes will be available. An audience of about 2,000 is expected and the civic authorities are co-operating. On the day following the demonstration Bon Viveur will be the guest of Southend. We look forward to the first demonstration with great interest, for the idea is full of promise and the prestige value should be considerable. We understand that Bon Vivieur's championing of gas and gas appliances will not be limited to these demonstrations—good news indeed, for they are valuable allies.

OBITUARY

JOHN TERRACE

We record with regret the death of MR. JOHN TERRACE, President of the Institution of Gas Engineers in 1929, and Hon. Secretary of the Institution from 1936 until the time of his death, which occurred on January 20. He had a serious illness some two or three years ago, but had sufficiently recovered to continue his active interest in the work of the Institution.

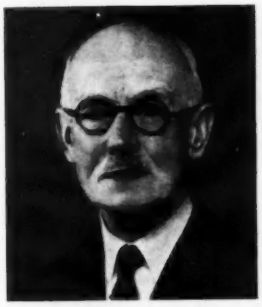
Mr. Terrace spent his early years training as a civil and mechanical engineer with Ashmore, Benson, Pease & Co., Ltd., and later was appointed constructing water engineer with Humphreys & Glasgow, Ltd., for which Company he spent some time in Australia. He was appointed Assistant Engineer to the Tottenham and Edmonton Gas Company in 1902, and in 1909 he became Engineer and Manager of the Great Grimsby Gas Company, a position he held for 10 years. In 1919 Mr. Terrace came to London to be Chief Engineer of the South Suburban Gas Company, with which Company he remained through the period of his Presidency of the Institution and until he retired in 1931.

For some years after his retirement Mr. Terrace continued to be actively engaged as a consulting gas engineer, and he was associated with a number of companies, including the Gas Purification and Chemical Co., Ltd., and some South African gas undertakings. His reputation was world-wide, and he had travelled extensively, visiting many parts of the world unfamiliar to most British gas engineers.

From 1903, when he was elected a member of the Institution of Gas Engineers, he continued for the rest of his life to be a most enthusiastic supporter of the Institution. He served on the Council from 1917 to 1921, and again from 1924 to 1935. He was elected Vice-President in 1927, and President in 1928, remaining in office until June, 1929, when the Institution celebrated the granting of its Royal Charter. In 1936 he took over the Hon. Secretaryship of the Institution from the late Mr. W. E. Price, and retained it until he died.

Specializing on education, Mr. Terrace was responsible with the late Mr. Walter Hole and the late Mr. H. H. Creasey, H.M.I., for the initiation of courses in gas engineering in many cities and towns throughout the country. He became Vice-Chairman of the Gas Education Committee in 1937, and Chairman in 1938. In 1950 he realized that it was desirable that a younger man should take over the duties and responsibilities which the Chairmanship of the Gas Education Committee entailed, and his resignation was accepted with considerable regret. After presenting the annual report of the Education Committee at the autumn research meeting in November, 1950, he handed over the duties to Mr. J. H. Dyde.

Early in the ensuing year those who had been President of the Institution since Mr. Terrace became Hon. Secretary in 1936, the then members of the Council, members of the Gas Education Committee at the time of his retirement, and intimate friends were moved to express their gratitude to him, and joined in making presentations of a personal gift (two Dunhill pipes in an inscribed case, together with an autographed list of contributors) and a permanent record of appreciation (an inscribed silver



cigarette box to be retained by the Institution and displayed and used on special occasions). Tributes to his work for the Institution were paid by Sir Harold Smith, Chairman (at that time Deputy Chairman) of the Gas Council, and Mr. D. M. Henshaw, then Chairman of W. C. Holmes & Co., Ltd., one of Mr. Terrace's oldest friends.

The headquarters of the Institution at 17, Grosvenor Crescent, had not long been acquired, and the presentation by that year's President, Mr. F. M. Birks, to Mr. Terrace was one of the first functions in the new premises. Mr. Birks recalled that the name of Terrace had been associated with the Institution of Gas Engineers and the organizations that preceded it almost from their beginning. The Transactions of the British Association of Gas Managers recorded that in 1870 David Terrace, of Leven, purchased Reports of the Association for 11s. 9d. This was, as far as could be traced, the earliest reference to John's father in the annals of the Institution.

Mr. John Terrace was the son of Mr. David Terrace, who was in his time an eminent gas engineer in London, Leven, Glasgow, and finally in Middlesbrough. Like his son John, David was interested in secretarial work, and was for many years Secretary and Treasurer of the North British Association of Gas Managers, and its President in 1888. He became a member of the British Association of Gas Managers in 1881, since when there has always been at least one member of the family on the register of the Institution. Mr. John Terrace's son, David, now General Manager and Engineer of the Cape Town and District Gas Light and Coke Company, South Africa, is also a member, having been elected in 1940.

The funeral service took place on Monday at St. Bartholomew's Church, Sydenham. The family mourners were led by Miss Terrace and Mr. David Terrace, and the Institution of Gas Engineers was officially represented by Mr. W. K. Tate (President), Dr. W. T. K. Braunholtz (Secretary) and Mr. A. G. Higgins (Assistant Secretary). Among the congregation were Sir Harold Smith (Chairman of the Gas Council), Mr. W. K. Hutchison (Chairman of the South Eastern Gas Board and Senior Vice-President of the Institution of Gas Engineers), Mr. J. H. Dyde (Chairman of the Gas Education Committee), and Mr. M. W. Burt (Director and Secretary of the Society of British Gas Industries).

MR. W. K. TATE, President of the Institution of Gas Engineers, writes: All members of the Institution will have heard with sorrow of the death, in his 81st year, of John Terrace, Hon. Secretary and a Past President of the Institution. Others will tell of his eminent career in the gas industry, of the distinction with which he filled the office of Charter President, and of his many connections with the industry following retirement, in 1931, from the position of Chief Engineer to the former South Suburban Gas Company, but it is of his service to the Institution in the later years of which I would write.

The duties of an Hon. Secretary are not defined in the Charter and, to a great extent, the unquestionable influence that he can exert is dependent on the man. Here John Terrace was supreme, and his undoubted intellect and attention to detail, until increasing years and a growing deafness militated against the former rapid appreciation of the point at issue, were ever a staunch help to succeeding Presidents and Councils. Guidance that is founded on long experience and a keen memory of past decisions and the reasons for them is invaluable, and in this the Institution always benefited greatly from its wise choice of 1936.

Outstanding as was the contribution here, it will perhaps be because of his association with the Education Committee that the memory of John Terrace will be held in the most honour by so many who have achieved success through the Institution's Education Scheme. His support for a scheme that provided a technical qualification for the gas engineer, equal to the highest granted by any engineering institution, began in the earliest days, and he realized at once that the mere setting of examination papers was but a part of the responsibility. From the beginning, he devoted himself to the initiation of courses in technical colleges throughout the country, which would provide the tuition required, and many generations of gas engineers have had, and always will have, great cause to bless his name for the facilities which, through his imme-

diate appreciation of the fundamental necessities, are available through the length and breadth of the land. The absence of text books which were abreast of modern development was also a constant source of anxiety to him, and his steps to repair the omission must have helped many who embarked on their career in the industry. The name of John Terrace and the purpose of an education scheme are synonymous and, while changes will certainly take place, the foundations which he laid with so much loving care and enthusiasm will always be a firm and stable rock.

John was not ambitious for worldly fame—indeed he was perhaps sometimes too modest—but the place he occupied in our affections was undoubtedly very dear to him, and gave ample reward to a gentle and kindly soul. He has now laid down his burden in peace and tranquility, leaving a gap in our ranks that indeed we cannot, and would not wish to, fill. To his son and his devoted daughter, on whom so much responsibility lay, we offer our sincere sympathy and our assurance that in their father's passing we also have lost a man who, through his bearing, his many virtues, and his selfless work for others, had earned our affection and deep regard.

MR. D. GOLDBERG, Sales Manager of Keith Blackman, Ltd., died on January 4. He had been with the Company for over 38 years.

Personal Notes

MR. W. DAWSON, of 14, Airedale Street, Bradford 2, (T/N Bradford 37996) has been appointed permanent Northern Representative of the Accurate Recording Instrument Co., Ltd., of Morden, Surrey.

MR. N. C. WILLIS, Assistant Purchasing Officer for the Birmingham District, has been appointed by the West Midlands Gas Board as Area Purchasing Officer at headquarters, and MR. C. F. WALTERS, Liaison Officer, has been appointed Deputy Area Purchasing Officer.

MR. ROBERT J. A. BENNETT, Assistant Manager of the Cowdenbeath district of the Scottish Gas Board, has received an appointment with the National Industrial Fuel Efficiency Service and leaves to take up his new post at Manchester at the end of this month. Mr. Bennett has been over six years at Cowdenbeath.

MR. J. E. SARGENT, Senior Assistant in the Chief Engineer's Department of the London County Council, has been appointed Assistant Engineer (Civil) at the headquarters of the West Midlands Gas Board. Other appointments announced by the West Midlands Board include that of MR. C. J. PARSONS, Engineer, Manager, and Secretary of the Stone District, to the post of Divisional Sales and Service Officer for North Staffordshire; and that of MR. E. B. R. JONES as Assistant Engineer at the Windsor Street Works, where he was formerly first engineering assistant.

MR. J. A. HOLLAND, M.I.C.A., Accountant, Parkinson Stove Co., Ltd., retired on December 31. He joined the Company in September, 1912, and completed 42 years unbroken service before reaching the retiring age of 65 in November. During the war, Mr. Holland was a Lieutenant in the Home Guard and the Army Cadet Force from 1941 to 1946. He was presented with a canteen of cutlery and a portable radio set by his colleagues. Mr. R. J. Rogers, Chairman, made the presentation in the presence of some of the members of the Group Long Service Association.

MR. J. MULHALL has been appointed to the position of sales representative of Bratt Colbran, Ltd. Mr. Mulhall was formerly employed by the Northern Gas Board at Durham.

MR. C. J. ATKINS has been appointed Sales Manager of Keith Blackman, Ltd., in succession to Mr. D. Goldberg, whose death is reported in this issue. Other appointments resulting from staff reorganization include those of MR. A. H. WOODLEY as Assistant Sales Manager, MR. F. W. GOODGE as Contracts Manager, and MR. D. HUMPHREY as Assistant to the Chief Engineer.

MR. J. E. C. BAILEY, C.B.E., Chairman and Managing Director of Baird and Tatlock (London), Ltd., and Hopkin and Williams, Ltd., manufacturers of scientific instruments, laboratory furnishings and fine chemicals, will tour the Middle and Far East from this week until March 15. He will visit the agents of the two companies in the various countries, and he will also contact important industries and laboratories in each territory. He proposes to visit Cairo, Karachi, Bombay, Ceylon, Calcutta, Singapore and Hong Kong.

MR. JOSEPH WALTON is retiring from the Joint Managing Directorship of Thos. W. Ward, Ltd., Albion Works, Sheffield, on January 31, but will still be available in a consultative capacity and will retain his position as Chairman and Managing Director of the Darlington Railway Plant and Foundry Co., Ltd., Darlington. Mr. Walton joined the firm as a youth, in 1904. He commenced his service in the rail department and has not been attached to any other department during his period of service. He has guided its destinies, building it up into an organization capable of constructing and laying private railway sidings on a very large scale, at steelworks, collieries, docks, electricity works, gasworks, and similar undertakings. Mr. Walton became a Local Director of Thos. W. Ward, Ltd., in 1927, was made a full Director in 1937, and was appointed Joint Managing Director in 1950.

Diary

Jan. 27.—NORTH THAMES G.C.C.: Gas Industry House, 2.30 p.m., followed by showing of North Thames Gas Board's latest films in the Gas Council's new cinema.

Feb. 1.—SOUTH EASTERN G.C.C.: Caxton Hall, Westminster. 11 a.m.

Feb. 1.—LONDON AND SOUTHERN SECTION, I.G.E.: Postponed discussion on 'Atmospheric Pollution,' introduced by Dr. G. E. Foxwell; Bishop Partridge Hall, Church House, Westminster (entrance in Great Smith Street), 2.40 p.m.

Feb. 2.—INSTITUTE OF FUEL: Adjourned Discussion on Beaver Report, at Institution of Civil Engineers, 5.30 p.m.

Feb. 2.—MANCHESTER JUNIORS: Visit to English Steel Corporation, North Street Works. 'Use of Fundamental Data in Gasworks Plant Design,' R. Pollard.

Feb. 4.—LONDON JUNIORS: 'Burner Design,' J. Prigg. 178, Edgware Road, London, W.2. 6.30 p.m.

Feb. 8.—MIDLAND JUNIORS 'Some Functions of a Coal Test Works,' G. E. Brooke. Birmingham.

Feb. 9.—YORKSHIRE JUNIORS: Visit to Stoves, Ltd., Rainhill.

Feb. 11.—SCOTTISH JUNIORS (WESTERN): 'Ubique,' F. D. Southwell. 522, Sauchiehall Street, Glasgow, C.2, 6 p.m.

Feb. 12.—SCOTTISH JUNIORS (EASTERN): Meeting at Falkirk.

Feb. 14.—PURCHASING OFFICERS' ASSOCIATION (LONDON BRANCH): "Some Aspects of the Modern Law of Contract,' J. S. Barnes, Solicitor, North Thames Gas Board.

Feb. 14.—WALES AND MON. JUNIORS (SOUTH): Visit to Smith Crisps, Ltd. 'Planning for Thermal Efficiency,' K. H. Langford.

Feb. 15.—LONDON AND SOUTHERN SECTION, I.G.E. 'Development of By-Products Works at Tottenham,' H. Wadsworth. 17, Grosvenor Crescent, London, S.W.1, 2.40 p.m.

Feb. 16.—LONDON JUNIORS: Visit to R. & A. Main, Edmonton.

Feb. 17. EASTERN SECTION I.G.E.: 'Technical Problems in the Utilization of Town Gas in Industry,' F. Dickenson and F. Johnson: 17, Grosvenor Crescent, S.W.1, 2.15 p.m.

Feb. 17. WALES AND MON. JUNIORS (SOUTH): Visit to Refrigeration Factory. 'Planning for Thermal Efficiency,' K. H. Langford.

Feb. 18.—MIDLAND SECTION, I.G.E.: Spring Meeting, Queen's Hotel, Birmingham.

Feb. 21. EASTERN G.C.C.: Connaught Rooms, Great Queen Street, Kingsway, W.C.2. 2 p.m.

Feb. 23. WESTERN JUNIORS: Visit to works and stores of Metal Agencies Co., Ltd., Bristol.

March 2.—SOUTH WESTERN G.C.C.: 34, Bridge Street, Taunton, 11 a.m.

The Constant Problem of the Coal Industry*

By SIR HUBERT HOULDSWORTH,
Q.C., D.SC., LL.D.
Chairman of the National Coal Board.

IT is natural that there should be grave anxiety when coal production—growing though it may be—is still not keeping up with leaping coal consumption. It is, therefore, very important that as many people as possible should have an understanding of the problems of the British coal mining industry and the way they are being tackled. It is particularly important that industrialists should appreciate the whole position as it affects their own consumption of fuel and power.

It must first be emphasized that a coal mine does not *produce* anything. The coal industry *extracts*, and coal is a wasting asset. All extractive industries necessarily pass through a definite 'life cycle'; a phase of opening up; a phase of more or less 'normal' working; and a phase of decline to extinction. Each of the National Coal Board's 900 collieries has its own 'life cycle,' and different collieries are at any one moment of time in different phases of their 'life cycle.' The productive capacity of the industry as a whole, therefore, is really the sum of 900 individual phases, each of which may be complicated by special changes, such as reconstruction to obtain increased output or to improve efficiency.

It is obvious that the industry's capacity to produce (or rather to *extract*) shrinks when the forces of decline prove stronger than the forces of 'opening up.' For a period of about 30 years—from the First World War till after the end of the Second World War—the general trend of coal output in Britain was downwards. Only one-tenth of our present output comes from pits which were opened up during that period. This was utterly insufficient to maintain capacity. Output declined, and so did capacity. It is true that the decline of output during the 'twenties and early 'thirties was brought about by a lack of demand, and not by geological exhaustion. But this only meant that the effects of the inherent forces of decline were not fully appreciated. It was imagined that the industry could at any time greatly expand its output, if only the markets required this. When the test came later, however, it showed that most coalfields were unable to achieve a quick expansion of output. The fall in output which had taken place had, in fact, been accompanied, although with a certain time-lag, by a fall in capacity and a serious loss of manpower. On Vesting Day, the industry's capacity was smaller than at any time in this century.

'The industry,' we are often told, 'produced 240 mill. tons in 1937. Why can it not do so now?' The answer is: 'The industry of 1937 does not really exist today.' Three thousand five hundred million tons of coal have been extracted since then. Where the same seams are still being worked the coalface, or actual point of extraction, tends to be farther away from the shaft; where different seams are being worked, because the old ones have been exhausted, they are often thinner and more difficult to work and consequently less productive, and contain more dirt bands. These are two factors which have reduced the 'capacity' of the industry. In addition, some pits have reached the end of their workable resources and have had to be closed altogether—an obvious loss of capacity.

What about the future, say, the next 10 years? There will be losses of capacity due to the closure of some existing collieries. There will be losses due to increasing washery discard as a result of working seams containing greater amounts of dirt bands, and there will be the losses resulting from the working of thinner seams. There will be some further loss of capacity because the coal which has then to be worked is at a greater distance from the shaft, though this factor will to some extent be compensated by better facilities for transporting men and materials to and from the coalfaces. The annual loss of capacity—if nothing is done to replace or 're-create' it—may be something of the order of 4 to 5 mill. tons. In other words, 10 years of coal-getting without any opening-up of new collieries or 're-creation' of old collieries through major reorganization schemes would mean a diminution of the industry's capacity by 40 to 50 mill. tons of annual output.

For the 10 years following the inter-war peak year of 1937—of which seven were war years—very little fundamental development work took place. It is estimated that the industry's capacity declined by about 50 mill. tons—that is, somewhat less than the decline in output.

'Capacity' as here discussed does not alone determine output. The annual working time of the pits also has a bearing. For example, there was about 2% loss of annual output when a second week's holiday for miners was introduced in 1953. On the other hand, despite the Five-Day Week Agreement of 1947, there is extensive Saturday working at the collieries, for which the miners should receive full credit.

It is generally possible to increase output in factories without providing additional floor space or machines, simply by working two or three shifts in the 24 hours. This is not so in the vast majority of our coal mines, even if the necessary men could be obtained. The process of extracting coal, by the mechanized longwall system of mining which predominates, involves preparatory and other operations which cannot, on the same face, be conducted simultaneously with the operation of filling coal. The coal has first to be cut and blasted; roadways have to be formed; stone packs have to be built to support the roof; the conveyors have to be moved forward.

These operations fall almost automatically into a three-shift cycle over the 24 hours. Thus the filling of coal from a particular longwall face can usually be done only on one shift each day; if the colliery is to work a double-shift of coal filling, then the faceroom must be doubled. The problem of providing this additional faceroom as well as the necessary manœuvring space in the workings, is often very difficult, even for double-shifting. Moreover, the working of the transport system cannot be continuous as repair and maintenance work is necessary in roadways which are constantly under heavy pressure and are subject to movement. Many of our pits do provide the extra faceroom to permit double-shifting, but in others, the effective underground capacity often restricts winding to a single shift.

It was clear after Vesting Day that the Board's main and most urgent task was the 're-creation' and expansion of the industry's capacity. The Board first made a detailed survey, colliery by colliery, of the industry's condition, of any existing development plans, and of the possibility of increasing output by new sinkings and reconstructions; and from these data the Board's proposals were formulated and summarized in *Plan for Coal* which was published in 1950. The survey showed that, because the proved areas of economically workable reserves of coal were not extensive, the opportunities remaining in Britain for opening new collieries in untouched

* From an article in the *Fuel Economy Review*, 1955, published by the Federation of British Industries.

territory were limited. It was evident that much of the coal would have to come from existing coalfields and from existing pits, and that a very large number of these would require extensive reconstruction if efficiency was to be maintained or improved. It was recognized that many pits would decline, and others would come soon to the end of their life, or run into very low efficiency.

Plan for Coal, which set out the Board's proposals for the development of the industry up to the period 1961-65, was designed to produce an annual output of about 240 mill. tons by the end of that period. To achieve this, more than 250 collieries were to be reconstructed so as to yield nearly 70% of all the coal required; a score of large new collieries and a number of new drift mines—many of these with short lives—would probably account for another 10% of the industry's total production. The remaining 20% would then come from some 250 collieries continuing in their existing state without big technical reorganization. As was made clear at the time, the plan was not to be a 'strait-jacket.' It was to undergo continuous revision in the light of more accurate knowledge. The Board is now aiming at producing a rather larger annual output in the period 1961-65—about 250 mill. tons by 1965 instead of the 240 mill. tons originally aimed for. The position is, broadly, that rather more coal is likely to be got from Yorkshire, Nottinghamshire, Derbyshire, Leicestershire, and Cannock Chase than the first plans suggested.

To carry out a plan on the scale which was shown to be necessary would have been no easy task at any time. The difficulties have been increased because inland consumption has risen more quickly than was generally anticipated.

Output in 1946 was nearly 50 mill. tons less than in 1936, but the tonnage of coal available for inland consumption showed little change for two reasons: First, because less coal went for exports and foreign bunkers (9 mill. tons in 1946 as against 46 mill. tons in 1936); and secondly, because opencast working, which was a wartime innovation, produced 9 mill. tons. In the first seven years after nationalisation, deep mined output increased by over 30 mill. tons, but the coal mining industry is still struggling to keep up with the rising inland demand. Further expansion has been hindered by the lack of capacity to which reference has been made.

Why then does not the Board double its reconstruction programme, or carry it out in half the time? The Board is, indeed, striving to speed up reconstruction and new sinkings. A really quick and spectacular increase in new capacity, however, is not practicable. Here are some of the reasons:

In the 19th century, it was possible to find a large number of sites for new collieries. Much of the geology of the shallower regions was exposed or could be deduced, and, where information was not available, greater risks could be taken, since the shafts were not very deep and small pits could be economic. Today it is very different.

When the Board took over the mines, exploration had been going on very slowly for several decades—there had been no incentive to seek means for expansion. The Board began at once to make borings on a much greater scale. At present as much boring is being done in one year as the coal industry did in about two decades before nationalization. However, sites for new collieries are few and far between. This is a fact of nature which man cannot alter.

The development of a new colliery today is a very large and costly undertaking. In general the coal seams in what are now virgin areas lie at greater depth than those preivously worked, and often are below water-bearing rocks. Obviously, the provision of capacity at depth is much slower than that from shallow reserves, because it takes longer to reach the *deeper* coal. Further, the producing units have to be larger than formerly in order to carry heavy overhead charges. Deep shafts add to the cost; so do machinery for raising the coal from deeper seams, and the necessary mining development, which often cannot be as simple as that adopted in the past. Nevertheless, the sinking of some 20 large new pits has been undertaken, and some of them are well in hand, although others are still in the planning stage.

Shallow coal has now generally been worked out. Such shallow coal as remains can be opened up quickly by drifts, and a number of small drift mines, mainly in Scotland, have made a useful addition to output. But the tonnage is small and the life of these mines is usually short.

Then there is the problem of maintaining current production, or of not losing too much of it This is a very big factor today in the reconstruction of existing collieries, which forms the bulk of our development programme. Reconstruction impedes current output and current output impedes reconstruction. Many projects would be enormously simplified and speeded up if it were possible to shut down the pit during reconstruction. This is seldom possible. The Board cannot afford to lose current production or to lose the men.

There is another factor of an entirely different kind. This reconstruction work is highly complicated and specialized. The long period of war and depression in which the industry lived left it in a very weak condition with regard to what is any industry's most vital asset, its number of highly qualified personnel, and the resources for planning and carrying out new developments. The Committee of eminent mining men, known as the Technical Advisory Committee on Coalmining, which reported in 1945, spoke about this in unmistakable terms. Much has been, and is being, done to correct this. The Board has expended money and effort on educational and training schemes to improve the supply of the engineers it requires—one of many activities of the Board the benefits of which will not be apparent immediately. Able men have to be selected and trained. Suitably qualified men from the operational side of the industry—which, unfortunately, is also short of adequate staff—are required for the planning and execution of the new work. It is necessary to build up the efficient machine required for this vast and specialized reconstruction programme. Truly a stupendous task.

It is obvious that the factors just mentioned must adversely affect the rate at which the creation of capacity is being carried out. Some difficulties are likely to be overcome or mitigated, but the geological limitations will remain, and, indeed, become of increasing importance unless virgin and workable deposits, at present unknown, are discovered. In the life cycle of our coalfields the opportunities for 'opening up' are becoming rarer, while the forces of decline are inevitably growing stronger. This should be known to users of coal and of its derivatives, coke, gas or electricity. The coal mining industry will, however, gain capacity steadily, although slowly, as more reconstruction schemes and new sinkings are completed. There will, of course, be disappointment with some schemes here and there in an industry as speculative as coalmining; but there is no doubt that reconstruction schemes will in fact bring increases in capacity and output.

It takes eight to 10 years before a new pit is in full production and six to seven to carry through a large scale reconstruction scheme. Consequently most of the necessary reconstruction and development work, with all the preliminary operations they require, has not yet had time to increase the output of coal or help more efficient production. But here and there we are getting encouraging improvements from the schemes of rather lesser scope which have been completed. For instance, Ledston Luck Colliery in Yorkshire, which had been closed before nationalisation, has, as a result of reconstruction, produced 300,000 tons per annum at a productivity of 67 cwt. a manshift—nearly three times the average for the country. A scheme at a small pit in Lancashire, Huncoat, has shown an improvement of over 75% in productivity—from 20 cwt. a manshift to 36 cwt.—with an increase in output from 82,000 tons to 219,000 tons per annum. In some cases the results are cumulative as stages of reconstruction are carried out. For instance, Littleton Colliery in Cannock Chase has shown an increase in output from 450,000 tons per annum to nearly 600,000 tons, with an increase in productivity from 20 to over 30 cwt. a manshift, although its reorganization is not complete. Bold Colliery in Lancashire, which is in the throes of a very big scheme of reconstruction and expansion, has increased output from 186,000 tons per annum to 336,000 with a productivity rise from 21½ cwt. to 30 cwt. a manshift.

From 1957 onwards the completion of some larger reconstruction schemes will begin to help further. The managerial and technical organization will also become more effective as the activities of the last seven years which the Board has undertaken in the fields of education and training begin to bear fruit.

When the *Plan for Coal* has been carried out and an output of about 250 mill. tons per annum has been attained, it must be realized that very strenuous efforts will still have to be continued to overcome the forces of decline so as to main-

(*Continued on page 242*)

Mr. Kenneth E. Stringer.

Work and Welfare—A Delicate Balance*

Dr. Kenneth P. Duncan.

By KENNETH E. STRINGER, *Personnel Manager, and* KENNETH P. DUNCAN, *Chief Medical Officer, South Western Gas Board*

THE question of the emphasis to be placed on the non-productive aspects of industry has become much more controversial of recent years. Larger groupings of private industries, nationalisation, together with increasing dispersal and mechanization have made it ever more difficult to avoid formulating policies in this field. The changing labour supply and demand position and the growing political power of the trade unions have meant that the eye of publicity is never far away from these policies; the manager of a small works who did his best by his men without reference to complicated agreements and systems now has to bear in mind that he may be setting precedents which will have repercussions distant both in space and time from his original actions. Something has undoubtedly been lost by this development, but mourning its passing does not help very much now. Management has had to think again about many of these problems and has had to broaden its horizon. That does not mean that personal management is any less important, but it does mean that a general framework within which that personal management must work is essential. Forces which may be operating from outside often have to be dealt with inside the industrial structure. The spread of education has meant that there are fewer unconditional followers who will accept the word of another as unquestionable law. The fear of unemployment is not so strong in the minds of the younger industrial workers. While we say quite boldly that the true emphasis on joint consultation, education, and welfare services is not yet enough, we are not subscribers to any theory that it could never become too much.

There are some who think that already things have moved too far and there are three main grounds of objection: (*a*) The managerial prerogative is being interfered with. This attitude implies that joint consultation signifies an indecisive management. 'The duty of a manager is to manage, and a labourer to labour.' (*b*) The cost is too great to be borne. This statement applies particularly to education and welfare services. (*c*) These are simply schemes for 'feather-bedding' the worker.

There are times when all these arguments are true and it is one of the duties of this paper to try to answer them and to defend the statement that the balance may, in fact, be not yet tilted enough.

Every man has to take his stand on certain matters to do with his home, his personal life, his responsibility to society, and also his relations with his fellow-men at his place of work. None of these answers is necessarily 100% logical and sometimes it may be wise to look aside from the strictly factual, or more accurately to look deeper than the strictly factual. That all is not as it should be in the relationships within industry is an accepted statement of fact. Some feel that much might yet be redeemed by paying more attention to these three factors of education, joint consultation, and welfare services. Before being rejected these advocates need a better hearing than is implied by branding them collectively as starry-eyed idealists. It is recorded that in 1770 the Duke of Orleans was riding in his carriage with a friend when they passed some friars walking barefoot in the snow. 'How terrible for them,' said the Duke, 'if what they believe in turns out not to be true.' 'How terrible for us,' said his friend, 'if it doesn't.'

* From a paper entitled 'Is the Balance of Industry being Unduly Tilted by Emphasis on Education, Joint Consultation, and Welfare Services?' presented to the South Western Section of the Institution of Gas Engineers at Taunton, January 12, 1955.

Educational Responsibilities

At a quick glance it might seem strange that industry should take upon itself educational responsibilities at all, and it is not uncommon to hear the complaint that two payments have to be made, one to the rates and one to the repair of the inadequacy of rate-provided schooling. On the other hand, it is not surprising, at a time when the net of general school education is being cast ever wider, that parents should wish to place their children in positions from which they can take advantage of the new prospects that their better start in life should offer them. It appears to be a natural reaction for a parent to wish for his child a wider horizon than he ever obtained for himself. It is a sign of the times that the advertisements in the 'Situations Vacant' columns of the big national newspapers usually contain such sentences as 'Further education facilities available,' or 'Training for promotion schemes in operation.' It is a logical thought that those industries which offer such inducements have a better chance of obtaining the more intelligent element from the ranks of the school-leavers or under-thirties generally.

If it is accepted that industry has to bear educational responsibilities, the nature of that education has to be defined. There is no dispute that a technical industry has to train its specialists in all the scientific aspects of its methods of production. Sums of money spent in this way are easily defended and the financial returns are not difficult to deduce. It is unlikely that vocational training would come under serious challenge even from those who feel that the balance of industry is being unduly tilted by emphasis on education. Their attack falls hardest on that aspect of education which is more general. With increasing frequency, criticisms are being made of the use by the universities and other further educational organizations of the moneys given them from direct grants or from industrial donations. It is said that not enough is being produced from the research laboratories which is directly applicable to the factories. This is a very fundamental challenge. It is a short-term 'realize your assets quickly' type of attitude, which if it gains ground could undo much of the reputation that the British educational system has patiently achieved over many years.

The Search for More Knowledge

Education is not only the gathering and classifying of more and more facts; it is the search for more and more knowledge and understanding. If industry is to play an increasing part in its development it is incumbent upon it to realize that pure research, abstract studies, and the humanities have a vital long-term part to play if industry is to be a responsible section of the social structure and not merely an aggregation of machines. It is a truism of the 20th century that man's hands

have moved faster than his mind and, by its contribution to education in the fullest sense, industry is helping to alleviate this dangerous state of affairs. It is wisdom that is sought and on which wise government or management is based. Someone once wrote in 'Who's Who' that he was 'educated in the holidays from Eton' and that phrase possibly summarizes the need for general as well as vocational development. It is this which makes technicians into managers.

In the field of technical training the need is apparent and realized. The only objection raised is that those whom a good industry trains may leave on promotion in other spheres. This is inevitable, but at the least a good training system guarantees a supply of good recruits, of whom full use can be made while they remain, and the alternative is the acceptance of safely mediocre staff only. A high standard of technical training ensures this better entry and while not all the products will be absorbed in the training industry, there will at least be a sufficiency of men worthy of advancement.

In this context, too, it is appropriate to mention the tendency of some progressive industries to bring in a few recruits from the ranks of the university graduates. If these are carefully chosen they should not be long in compensating for the lack of detailed technical knowledge and if their university time has been well spent they should prove a valuable infusion. There is no real need for jealousy; both streams of recruitment are complementary. It has in fairness to be said, however, that the mere possession of a degree confers no wonderful powers on a man and these entrants will have to show considerable adaptability, and a willingness to continue their education in all its aspects—technical and general, to prove their worth.

It is an interesting commentary that one of the terms of reference of the recent touring Productivity Committees has been manpower utilization and it is on this standard that the efficiency and value of education schemes must be judged. The nation cannot afford not to make the best use of its mental as well as its physical resources. It is not enough merely to appoint industrial representatives to sit on the boards of governors of technical colleges.

Joint Consultation

If one accepts that education is worthy of more emphasis and that its benefits are to be ever more widely spread, it appears illogical not to expect that those who have come under its influence will wish to exercise their minds on the situation around them. Unlike law, medicine, or engineering, management has no real text-books to fall back on for the solution of its most complex problems, but the theory of joint consultation is that there is the sum total of experience of those employed to be tapped. If it does not yet always fulfil that function it may be at least partly because the mechanics of the scheme are not working very well; the index of the book, as it were, is not properly compiled, so reference becomes very complicated.

The responsibility for the successful achievement of joint consultation rests solely on the management. It is a responsibility that cannot be shared; only the successful conclusion to these efforts may be shared. The crux of the problem is not what we achieve but how the results are brought about. The real effectiveness of any joint consultation lies not in the end result alone but in the means and methods worked out to achieve a result. We must realize that production committees and joint consultative committees are not—as many are inclined to regard them—a rather vague form of democracy, but rather a definite part of a co-ordinating process, which affects the very structure of the organization.

One of the phrases in frequent use today is 'industrial democracy' and if, as so often is the case, this is meant to imply an equal sharing of management responsibility by the workers, or, more bluntly, control of the organization by the workers, and if democracy means what we intend by our system of national and local government, then such an idea can never be a reality. It is a dream which can only give a very bad hangover. If a man learns a skill which is applicable only to one industry or group of industries, he feels he has a stake in them just as surely as if he invests money in them. He feels he ought to have some knowledge of how fruitfully the end products of his skills are being used, and that being so, he feels he should have some say in how they are used.

No organization can stay static, either in its technologies or its methods of co-ordination of those technologies. If attention paid to items other than the chopping of wood or the drawing of water is regarded as an emphasis which may tend to destroy what some people believe to be the correct balance in industry, then it must be accepted that in the necessity that lies before us to develop further our position in industry internationally such emphasis there will always be.

A Sheer Waste

From another point of view, it seems sheer waste not to use the resources that have cost money to develop. The knowledge must often be available within the industry if it could only be tapped and a parallel might be drawn to the Gas Council's search for natural gas, with one exception that this concealed knowledge appears to lack the innate pressure to make itself apparent. The difficulty of the search, however, proves nothing about the quality of the object of search.

Truly successful joint consultation depends not mainly on its structural organization but on an attitude of mind which has to be present or engendered in the two consulting groups. If it comes to mean merely a series of formal meetings it is undoubtedly a waste of time and effort, but if it can be fostered and developed it has been proved to be a most valuable asset to a firm. Answers can only be forthcoming from genuine enquiry and it is no part of a consultative committee's duties to be the sounding board of objections to managerial policy just because it is managerial. On the other hand it is not the committee's function to put a series of rubber stamps on a succession of employers' completed actions. It should be the place where, subjecting themselves to the purpose of the whole, employees can bring to the attention of the management constructive forward-looking suggestions and proposals for the implementation of overall policy. As an instance, if a management plans to change the location of some operation, the machinery of joint consultation should be able to fill in many detailed aspects of how to execute the change with the maximum efficiency and minimum inconvenience. Joint consultation is not meant to provide a medium for a description of a *fait accompli;* it is the placing of an end result before people and asking them to work out how to get there. It goes on within the strata of management everywhere. A chairman of a board may say to a works manager—'This is our budget: there are our broad aims—let me know a production programme, please.' So it goes on, at least part of the way down the line, and even though a man is paid for manual work it is reasonable to assume that he must from time to time have a thought about it and the better his education the more coherent, and presumably better, his thoughts. On a small scale, it has always been practised and there can be few managers who have never asked the opinion of the man with the shovel on some point that he might be expected to have specialized knowledge about. It is when one comes to the bigger aggregations of workers and the more complicated organizations that the implementation of the principle becomes more difficult.

Spectres of Past Prejudices

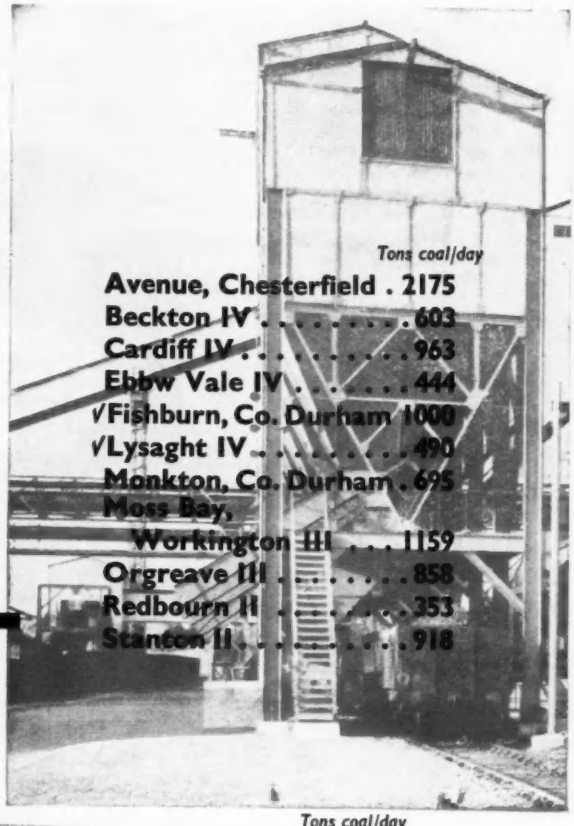
If the system of joint consultation is sincerely worked out and sincerely tried for a fair period and gives no results, it would be fair to scrap it and save its cost, though that is not very great. It is a part of the whole employer-employee relationship. That very fact does, to some extent, make it harder in application than in theory because there are always lurking in the background the spectres of past prejudices. Tradition on both sides dies hard. 'A manager's duty is to manage, and a labourer should labour.' There may be an element of fear in that cry because it is harder to lead than to dominate. 'Anyone can govern in a state of siege,' said Cavour, and that might be fairly applied to industrial despotism. On the other side, joint consultation may fail if its machinery stems from representation of a trade union organization which is traditionally 'again the government.' The only answer to both these difficulties probably is in the previous heading of education, and there is no good pretending that this is capable of quick, short-term success. It is, however, fair to say that not yet is the balance of industry too much tilted by emphasis on joint consultation.

Welfare services in their broadest sense include such things as *ex gratia* grants, pension schemes, medical schemes, sick

W-D in 1954 were "on site" building

11 NEW COKING PLANTS

26 NEW GASMAKING PLANTS



	Tons coal/day
Avenue, Chesterfield	2175
Beckton IV	603
Cardiff IV	963
Ebbw Vale IV	444
√Fishburn, Co. Durham	1000
√Lysaght IV	490
Monkton, Co. Durham	695
Moss Bay, Workington III	1159
Orgreave III	858
Redbourn II	353
Stanton II	918

	Tons coal/day
Aberdeen V	175
√Boston	96
√Brighton III	406
Christchurch, New Zealand	150
√Croydon IV	270
√Derby II	380
√Derby III	380
Dover	341
East Cowes	245
√Edinburgh IV	259
Edinburgh V	259
Exeter	377
Gainsborough III	18
Glasgow Provan II	436
Glasgow Tradeston II	179
Grimsby VI	80
Irvine III	18
√Jersey	190
√Lincoln IV	138
Rotherham	617
√Smethwick III	205
Solihull III	50
Tingley II	511
√Tottenham V	93
Walsall II	821

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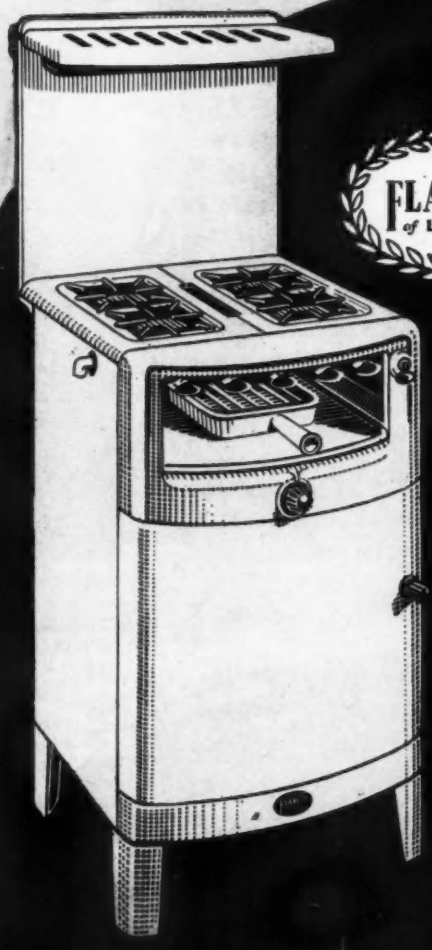

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visiting, social and recreational amenities, sick-pay schemes, etc. It must be acknowledged that under this heading come the most justifiable criticisms from those who feel that the balance of industry is being unduly tilted. Instances of over-emphasis on this aspect have occurred and do exist, but they should not obscure the fact that the welfare services provided by industry are important, and that there are at least an equal number of instances where the balance has not yet tilted enough.

The objects covered by the omnibus term 'welfare services' can be, for convenience, split into three groups: (i) Ensuring that the conditions of employment are not detrimental to health; (ii) allowing for the factor of individual variations and some flexibility even within a large organization with its inevitable rules and regulations, which, however carefully drafted, will never fit each and every case; (iii) assisting the employee in bad times by direct help or by guidance in the interpretation of the plethora of regulations consequent upon an increasingly complex maze of social services.

To achieve these aims diverse different types of welfare organizations have grown up and these can again be divided into two main groups: (a) Group welfare arrangements, and (b) advisory services ancillary to personal management.

Group welfare arrangements, by their very complexity, can possess the seeds of their own destruction. To allow for the variations inherent in the nature of the problems to be covered is so difficult that the organization grows larger and larger, and more and more remote, until eventually it, in turn, requires an interpeter to the rank and file. This can lead to increasing specialization within itself and, in this particular field, that often means an increasing impersonality and a decreasing common sense humanity. There are good and bad workers in the sphere of welfare services as everywhere else, but in large schemes even the best of them can drift into a theoreticians' paradise where the realities of life can hardly penetrate and can cut themselves off, or be cut off by the system, from the individuals on whose trust their success ultimately depends. The large umbrella of security which these organizations erect very often comes to cover the wrong people. One might have the temerity to suggest that instances of this have been sometimes seen in the use of the national assistance funds. It is the individuals who need help; the problems are individual problems and the aid must be forthcoming in an individual way.

It is alleged that with the development of these services there has come an increase, for example, in the amount of malingering among those at work, but it is doubtful if this has really been proven. More often malingering is a reflection of morale, and it may be that an elaborate welfare organization in a low-morale industrial concern provides the ideal cover. There is always a certain irreducible minimum of moral weaklings, scroungers, 'something for nothing' merchants, and reluctant operatives, but usually if these cases are studied in detail one of two conclusions is reached—either the diagnosis is wrong and the man is producing quasi-physical symptoms to cover up a deep-seated psychological strife, or, if the diagnosis is correct, there was at some time an opportunity for taking decisive managerial remedial action and that chance was lost. If the chance is lost and a man achieves his ends by malingering it is pretty certain that he will attempt the successful manœuvre again. On this occasion it may be much more difficult to deal with the problem and strong action against the man may lead to the charge of victimization and to all sorts of complications. There is an obvious parallel to certain types of bodily growth which, if detected early, can be removed, but which if mis-diagnosed or ignored will spread and become inoperable. To continue in a medical analogy, however, it is true to say that prevention is better than cure in this case, and the maintenance of a high morale, in which sincere well-applied welfare services can play a large part, goes far to obviate the problem.

How Much can Industry Afford to Tilt ?

What can be put on each side of the scale to allow a true balance to be made? Some of the factors in welfare have a statutory minimum which has to be achieved, but it is doubtful if there are many who would commend this letter of the law basis as being sufficient. Again, it would appear to be true to say that there is a progressive increase in emphasis on joint consultation, education, and welfare services throughout the industrial world at home and abroad. If that is so, and any individual manager or concern rejects the wisdom of the conclusions of his colleagues, it may well be that eventually a certain amount of action will be forced upon him. It would appear better to formulate one's own policy of calculated emphasis than to have one imposed by statute or other outside pressure. The standards of practice vary enormously at the present time, and the final judge is the individual manager himself. These are matters of opinion and there is no agreed formula for the correct answer.

The fact that there is a need for regarding these aspects of managment as having to be studied, learned, and constantly applied, is increasingly accepted. The recent success of what are called 'American Methods' in the construction of a refinery at Fawley has been widely publicized, and it is arresting to note that in a report on these methods one finds strikingly little reference to specialized technical skill but constantly recurring allusion to what might be called 'management skills.' Attention to labour relations, spreading information about the progress of the job, teaching by personal example, careful attention to physical amenities, prompt treatment of suggestions and complaints—these are the recurring themes used to explain the success of this enormous constructional operation. These are not new bits of knowledge but the novelty is in the importance attached to them and the results of the experiment can only be called excellent.

It is true to say that it is much more difficult to be a manager today than it was a number of years ago; there is increased central government authority; there is no pushing queue of unemployed at the door; there is not always the same respect for the position of management as such, and competition grows no less keen. The reconciliation of the balance, the weighting of the two pans on the scales, becomes very, very difficult, but still the balance has to be struck. The fact that we are unable to place on each side the hard, concrete statements that ought to be there does not necessarily prove that we are failing in realism; we submit that it indicates the need for further research, and as an indication that we are not alone in that conclusion there is the recent establishment of a Joint Committee of the Department of Scientific and Industrial Research and the Medical Research Council to report on 'Human Relations in Industry.' We are only at the beginning of the study of the factors on one side of the balance. It is our guess that the result will be additional emphasis on education, joint consultation, and welfare services, and that it will be shown that far from being a source of embarrassment to industry these three factors, correctly interpreted and sincerely applied, will be shown to be vital to its progressive development.

DISCUSSION

Mr. W. B. Claridge (Swindon), Chairman of the Section, before calling on Dr. Duncan to present the paper, referred with regret to the fact that Mr. Stringer was prevented by illness from attending the meeting. Although the paper was the joint work of two authors the burden of introducing the paper and answering questions must therefore fall on Dr. Duncan, whom he warmly welcomed. They had first heard the authors' views at a conference of senior officers of the Board at Moretonhampstead, and more recently they had presented an inspiring paper to the Western Junior Gas Association. There could never be any finality about so important a subject.

Mr. W. K. Tate, President of the Institution of Gas Engineers, opening the discussion, said he agreed with the authors that as yet there was no question whatever of any balance being tilted adversely in the gas industry through activities on education, joint consultation, or welfare services. He was doubtful if the balance ever could be tilted if those three things were kept under control by both parties. That meant that in so far as the employer was concerned one did not want to be too lavish in any direction, and on the beneficiaries' side the benefits offered should be appreciated and understood.

Fawley, to which the authors had referred in the closing section of their paper, was in that part of England which he looked after from the gas point of view, and he could say that undoubtedly a very great success had been achieved by the constructional teams. The labour (or 'hands,' to use an old-fashioned word) was English; the supervision was almost

entirely American. The rates of pay were more than twice those in force for comparable employment in the vicinity, and the result was that the gas industry, like many other industries extending as far north as Oxford, lost a very substantial body of men for the period of the construction; and they lost a considerable number of the younger men, quite naturally, because they were more mobile and did not have residential commitments and were more amenable to the new formation of industry. When the first stage had been built the remaining staff was small, and much of the labour flowed back.

He went to Fawley on more than one occasion, and he did not see anything there that struck him particularly as very 'Rolls Royce.' He saw the workmen's canteens and the living quarters—largely 'prefabs'—and the conditions generally did not seem to be anything better than could be offered by English industry today.

In dealing with human relations he felt they should be particularly careful not to attach too much importance to cryptic remarks or pronouncements by other people on the same subject, especially in other countries, because they did not necessarily know the background of those remarks, and they did not know whether they had any political trends. Unless they knew the full context of those matters of human relations they had to think very much by themselves. Education was a thorny problem, and he could not see what the employer could do towards providing much more than vocational training. If a young person who very shortly if not already would not start ordinary work until he was 16 years of age or thereabouts had had inculcated in him (or had not) during his school life the wish to know more about what might be called the arts or the humanities he did not see how the employer could help him. They had been told for many years by the trade unions that their workmen should have more leisure time, and surely it was in that leisure time that education in its broadest sense should continue.

Since the war workmen's hours per week had grown less and their leisure time had increased. They all knew fairly well what had in fact been done in that leisure time, and he doubted very much whether it was all educational. On the question of joint consultation he contested the authors' statement that the responsibility for its successful achievement rested primarily on the management. The management had a responsibility in that it must show patience and tolerance and good faith, but there must be something contributed from the other side. If there ever was an opportunity for a better understanding it was by joint consultation, and if one party would not use its opportunities he did not see how joint consultation could really succeed. That was not to say it was not succeeding, but he felt it was succeeding rather slowly.

His purely personal impression was that since joint consultation had been introduced generally throughout the gas industry there had been an end of the first flush of enthusiasm, and it was sometimes difficult to find people who would serve as representatives of the employees on the appropriate side of those committees.

Turning to welfare, Mr. Tate said he was sure no one would dispute the benefits of true welfare service. It was one of the few remaining activities where the personal touch could be maintained. Some of them were present at the meeting of the Western Juniors Gas Association at Bath in December, and no doubt they remembered the remarks of Mr. James Carr and others on the benefits of the personal touch. Those benefits were of real value, and if they were achieved at all levels then to some extent the necessity for joint consultation, and even to some extent the necessity for education, tended to decline.

He had been favoured with an advance copy of the paper and although he had read through it five times he found some difficulty in following some of the authors' arguments, and while he hoped he had said nothing that tended to disprove the necessity for the three matters of education, joint consultation, and welfare services—indeed he felt sure they were necessary—he still found himself groping in the dark as to how they could best take advantage of the facilities that were available everywhere; how best they could apply their knowledge of those things; and how best they could extract help from others.

Dr. Duncan said everybody was groping in the dark, and that was their justification for presenting the paper. He agreed that conditions at Fawley were exceptional; the report on Fawley had been at great pains to stress the fact that the circumstances were abnormal. When the organization came to the site it said it would not deal with all the different trade unions that most industries were faced with. It dealt with only one union. With regard to education, there were one or two ways in which it was fair to say that an industry could have an effect on the general education of the community and of its own employees, and one thing in his mind was the question of research grants. One very good example concerned a large drug firm which gave a grant to his (Dr. Duncan's) own university on condition that it had the products of that particular research, and the research was on certain lines.

Mr. T. L. Tallentire (Cheltenham) said that in the course of developing joint consultation the industry had met with two extremes. On the one hand it was sometimes difficult to get people to come forward to participate in joint consultation, and on the other they sometimes found people too eager to talk. It was difficult to see whether conditions were too good to need consultation, or whether there was a sense of frustration.

Mr. J. D. Butler (Cheltenham) said a good deal of that side of joint consultation which meant sitting round the conference table was working very well. They were now taking it out on to the 'field' and bringing in fitters and others who were now represented on the sub-committees. There was a distinct feeling that everyone wanted to do his best in the difficult matter of trying to improve things.

Mr. O. Pincock (Weston-super-Mare) said it was their duty to establish good welfare conditions for their colleagues and employees. So far as education was concerned they were agreed that it was up to everyone to promote the education and wellbeing and knowledge of all employees so that they could do a better job of work. His own view on joint consultation, however, was that it was a complete waste of time. The reason was that the first or primary function of education had not yet been completed. The authors had spoken of joint consultation as the point at which employees could subject themselves to the purpose of the whole, but he had still to find a collection of workmen who would subject their individuality to the welfare of the whole. Until they had educated themselves and their workpeople in the aims of industry—which they were trying to do—the idea of joint consultation could not be developed into complete success.

Dr. Duncan claimed that joint consultation showed some glimmer of success.

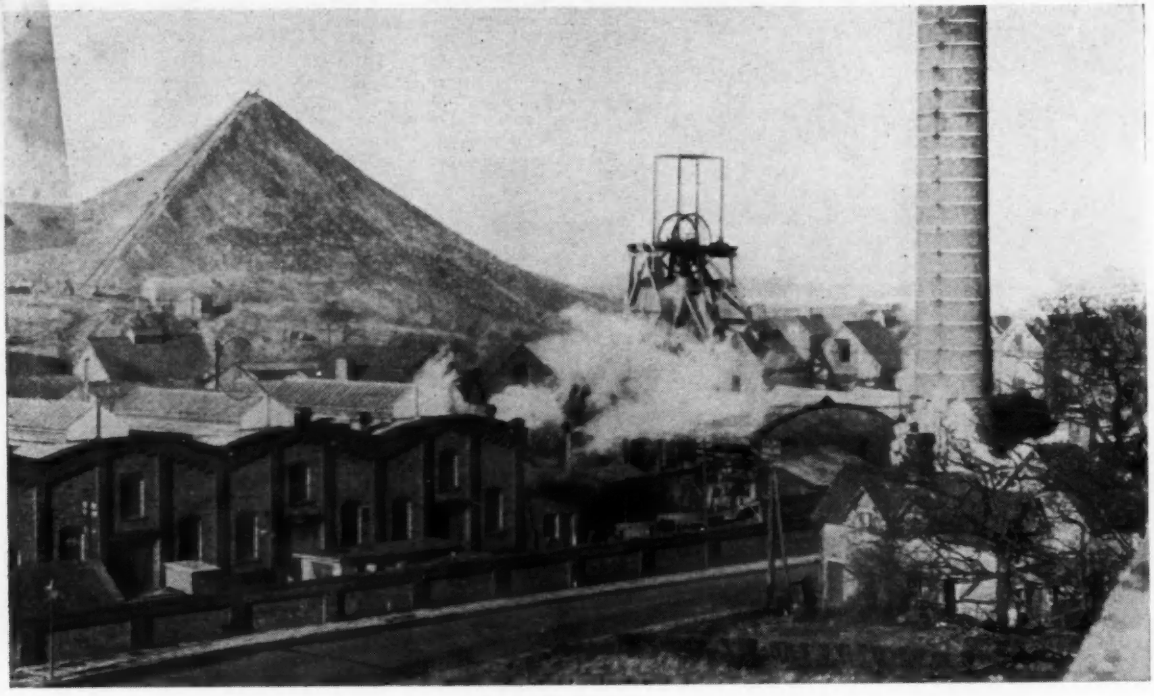
The Chairman said that from his own experience the success or otherwise of joint consultation depended very largely on the composition of the committee. In approaching the task of consultation the managerial as well as the employee sides of the industry must be prepared to learn. If they were not prepared to learn they could not help, and the whole question of consultation was going to be a delicate subject for time time.

Mr. F. G. Craxford (Taunton) said too many people seemed to have the idea that welfare services consisted in giving away money when a person fell on hard times. They went a great deal further than that, and involved different types of treatment for different circumstances. He instanced the case of an employee whose wife was taken ill and who, because of the home circumstances and the impossibility of getting domestic help, was obliged to ask for a 'holiday' in order to look after the children. He asked whether it was better for such a man to lose time, or for arrangements to be made temporarily for him to arrive late and leave early in order to keep the home going.

Dr. Duncan agreed that it was easy to give money away without achieving anything in the way of welfare service. There was a danger of losing sight of the general sense of welfare. On the other hand a case such as that mentioned by Mr. Craxford might well give rise to all sorts of problems, but ways must be found of doing things of lasting merit. Often a man's whole outlook was changed by finding him a different kind of job, either at the same works or elsewhere. If they could allow a certain amount of flexibility so that a man could be re-employed they would have made a friend for life.

Mr. C. R. Ingham, Immediate Past Chairman of the Section, proposed a vote of thanks to the authors.

Dr. Duncan, in acknowledgment, said he had only been in the gas industry a few months. He was warned by many friends that he was leaving one dark and benighted industry for another, and that he would meet with many of his pet aversions. He had not found it so, and he thanked the members for the kindness and courtesy and friendship they had extended to him in that short time.



A view of the headgear at one of the shafts of Littleton Colliery showing pit tip in background.

The Coal Industry at Work

On January 20, members of the London and Southern Junior Gas Association visited Littleton and Mid-Cannock Collieries in the West Midlands Division of the National Coal Board. In this article we give a brief description of these collieries.

IT has frequently been urged in postwar years that there should be a power and fuel policy which should co-ordinate the use of the production of the coal, gas, and electricity industries so as to avoid overlapping and to make the most effective use of coal. While the decision on that must rest with Parliament it is obviously in the best interests of all three of these basic industries that they should have a knowledge and understanding of each other.

With the gas industry predominantly dependent on coal, an understanding of the problems involved in the winning of coal and what the National Coal Board is doing to modernize the coal industry to secure a higher output is of particular interest to those engaged in the gas industry. Visits such as that made by the London and Southern Junior Gas Association to the Cannock Chase coalfield in the West Midlands enable gas engineers to see at first hand the methods employed in getting coal, some of the problems, and the way in which the coal industry is being developed to secure both better conditions and higher output.

Cannock Chase is not a coalfield that yields gas coal but the principles of mining employed there are common to the greater part of the industry. As in any other coalfield it has been necessary to undertake a great deal of re-organization and modernization of the coal mines in this coalfield.

The London and Southern Junior Gas Association visited Littleton and Mid-Cannock Collieries. Both these collieries are excellent examples of what the Board has been doing in bringing the British coal industry up to standards in keeping with modern requirements. Members of the Association were able to see in these two collieries schemes which have reached an advanced stage of progress and which already are yielding considerable benefits in the saving of manpower and increase of output. A number of factors are common to all collieries. The coal must be got from the coal face, transported underground to the pit shaft, brought up the shaft, and prepared on the surface for the market before being despatched either by railway wagon, by lorry, canal, or, in the case of coastal areas, by sea.

When the National Coal Board took over the British coal industry, it had to be decided at what point the work of re-organization must first be tackled. According to the conditions in the various coalfields, some variations were necessary but in the main the cardinal point demanding the urgent attention of the Board was that of underground transport.

Cannock Chase was a typical example of this need. Prior to nationalisation there existed in the pits of the coalfield a very large proportion of undulating roadways underground which ran in all sorts of directions. This was due to the way in which the coal had been worked previously. The means of moving coal from the coal face to the pit bottom were generally a mixture of rope haulages of various kinds and pit ponies. For both these purposes small tubs of 10 to 12 cwt. capacity were used in small ' journeys.' These methods necessitated the use of fairly considerable numbers of men while moving relatively small amounts of coal at a time.

Although fully aware of the need to improve efficiency at the coal face, so as to produce more coal at the point of

Fig. 1. Underground roadway at Littleton Colliery showing locomotive haulage.

production, the Board recognized that it was useless to produce more coal without the means of moving more, and at a higher speed, through the underground roadways.

In other words, transport underground was in a sense a bottleneck and this problem would naturally be aggravated by increasing appreciably the amounts of coal to be moved from the coal face to the pit top. Before increasing the amount of coal coming off the coal face it was essential that the capacity of the haulage system underground should be rendered capable of dealing with all that, or more than, was likely by any reasonable measure to be got from the coal face.

After examination of the problem in all its aspects, it was decided that in respect of many of the pits the only effective way to provide adequate underground handling of coal would be by the combination of conveyor belts and locomotive haulage. Introduction of this modern form of transport necessitated the provision of considerable lengths of straight, level and spacious roadways for locomotives and of straight roads for conveyor belt systems although, in the case of the conveyor roads, some degree of gradient could be accepted.

Combined with the introduction of locomotive haulage it was decided to substitute, for the small tubs, mine cars capable of taking 2½ tons each. By despatching the coal from the coal face on conveyor belts to suitable loading points and there discharging the coal into these large capacity mine cars, considerable tonnages could be moved at one haul by the diesel locomotives, compared with the relatively small tonnage that could be moved by the old methods. Not the least important advantage of using this method of underground transport is the considerable saving in manpower that results. This enables more men to be trained for work on the coal face, thus enabling more effective and productive use to be made of valuable manpower.

Introduction of locomotive haulage necessitated the provision of a railway track of a higher standard and weight than that previously employed for rope or pony haulage and the adoption of general locomotive practice. The general impression given to the layman visiting a colliery where locomotive haulage is installed is very like that of the London underground railways.

While underground transport is a vital link in the chain of improvements to secure better production it was equally necessary to give close attention to the handling of coal on arrival at the surface. Underground transport and surface handling are complementary and without radical improvements being made on the surface the expenditure and work done below ground would be largely nullified. Layouts on the surface at the time of nationalisation were tied to requirements which had largely disappeared.

Whereas at one time the demand had been for careful selection of various classes of fuel for both industrial and domestic purposes, the enormous expansion in the use of gas and electricity in the home and in industry had largely removed the demand for the degree of selectivity which had previously existed. As a result it was possible to re-plan the surface of collieries undergoing modernization on a simpler basis. This affected particularly the surface handling of coal and coal preparation plants.

Littleton and Mid-Cannock Collieries

Typical of the surface arrangements made where collieries are being reconstructed or modernized are those at Littleton and Mid-Cannock Collieries. The principle is the same at both collieries. As at the pit bottom, there is mechanical equipment at the top of the shaft for removing full mine cars from the cages and replacing them with empty mine cars to be sent below again.

On being removed from the cages, the full mine cars are sent along a short rail circuit—on which their flow is mechanically regulated—to a tippler. In the tippler the mine cars are revolved so that they are turned upside down, and the coal they contain falls on a moving conveyor belt immediately below. The belt takes the coal direct to the preparation plant. Without pause the now empty mine car is brought to the upright position and continues round the short rail circuit to the opposite, or 'empty', side of the pit shaft from which it landed, ready to go below ground again. This system replaces masses of rails, often covering a large area, and can be controlled by one man in a control cabin as compared with the need of perhaps a score or so of men for the old method.

It was of course, necessary to ensure that the coal preparation plant would be capable of handling the output likely to result from the underground improvements. Here again the employment of modern coal preparation plant enables a considerable number of men to be saved. With the older plant, every size of coal down to the smallest domestic size nut had to be screened by hand and all below that size had to be marketed with the dirt that came out of the pit with it because it could not be sorted by hand. With modern coal preparation plant, coal below approximately 6 in. in cube goes to a washery where by one process or another the coal is divided from the dirt and suitably sized.

By and large the method used in collieries to get the coal

Fig. 2. A train of tubs approaching the pit-bottom at Mid-Cannock Colliery.

is to cut it by means of a coal cutting machine, and to use explosives to break it down afterwards. The coal broken down is loaded on to a conveyor system and in pits like Littleton and Mid-Cannock distributed from the conveyor system into large capacity mine cars drawn by diesel or electric locomotives.

It is the objective of the Board to get the coal obtained at the coal face loaded on to conveyor belts by mechanical means in order to cut out the shovel work that exists so largely at the present time. A good deal of progress has been made in providing mechanical loaders and it is expected that the problem will be solved in the near future. When that has been achieved the mechanization of the industry will have been largely secured.

At Littleton Colliery the underground system of roadways has been revolutionized by the introduction of conveyor belts and locomotive haulage. Whereas, previously, endless rope haulage along narrow undulating and twisting roads was employed the new locomotive roads run straight and level and are 15 ft. wide by 10 ft. high. By the use of concrete and steel arches the roadways are made both permanent and pleasing in appearance. They are brilliantly lighted with specially developed fluorescent lamps of a safety type. While a considerable amount of other roadways had to be driven as part of this scheme, the level roadways required for locomotive haulage alone had to be driven some 3,600 yards. Roadways of the dimensions used at this colliery can only progress at an average speed of about 20 yards a week, so that the size of the task can be appreciated as well as the time factor involved in carrying out large scale schemes of this sort.

A number of seams of coal are worked at Littleton Colliery, which produces both house and industrial coal. In the area

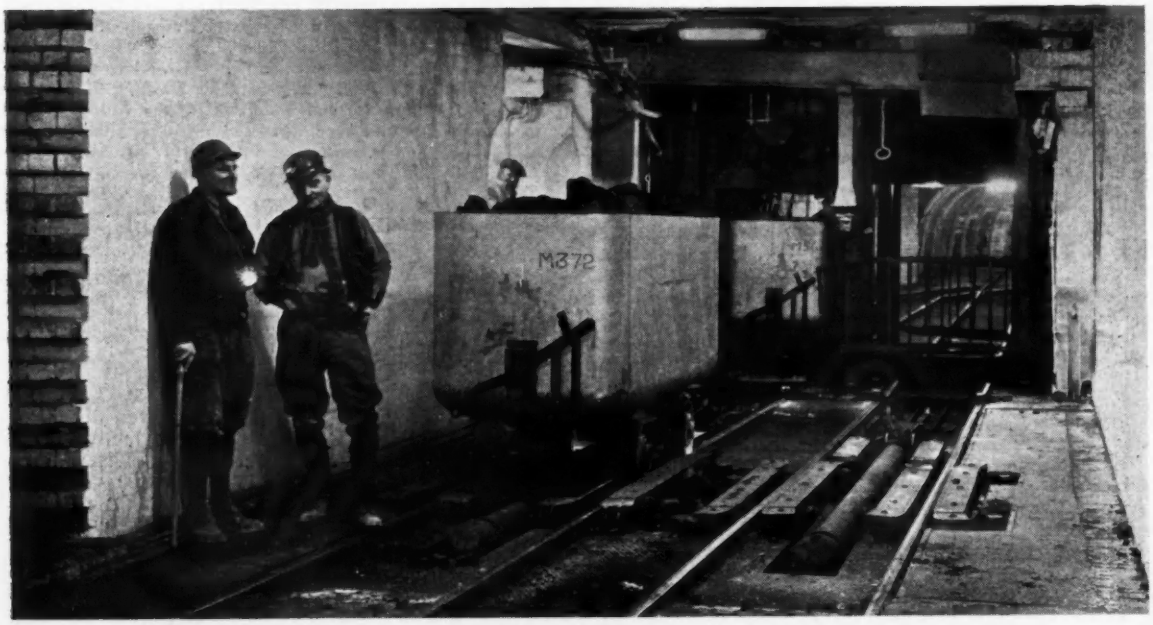


Fig. 3. A view of the new shaft bottom at Mid-Cannock Colliery.

Fig. 4. The new underground electrical sub-station at Mid-Cannock Colliery

worked by this colliery the same seams are found at different levels. For this reason the coal is worked from two shafts, each dealing with the seams at a different depth. Coal is brought up both shafts. Prior to the large-scale re-organization undertaken at Littleton the steam for the powering of the steam winders used for operating the cages in the shafts was obtained from batteries of hand-fired Lancashire boilers. As part of the scheme, these boilers have been replaced by modern boiler tube plant which shows a considerable saving in the amount of coal consumed and is mechanically stoked.

In the first year of nationalisation (1947) output at Littleton Colliery was 440,000 tons with an efficiency (or overall output per man shift) of 22.7 cwt. In 1953 the output had been increased to 532,000 tons with an efficiency of 28.3 cwt. Figures for 1954 are not yet available but they will show a further improvement.

While the redevelopment of Mid-Cannock Colliery follows much the same lines as those at Littleton Colliery an additional interesting feature is provided by the amalgamation with it of the Cannock and Leacroft Colliery three-quarters of a mile away through the driving of an underground tunnel to link the two pits. By means of this tunnel the output from Cannock and Leacroft Colliery is brought by diesel locomotive to the coal winding shaft of Mid-Cannock Colliery where it is raised to the surface and dealt with in the coal preparation plant, together with the coal from Mid-Cannock Colliery itself. Advantages of this link-up between the two collieries is a saving in the number of men needed to handle the coal, a saving in preparation plant and other equipment and the centralization of the administration of the two pits. Even more important, it means that, with the two collieries working as one unit, reserves totalling 20 mill. tons of coal can be exploited. With an annual output of some 700,000 tons this gives 30 years' life to the pits.

Among other features of the scheme carried out at Mid-Cannock Colliery is the replacement of the old steam winders by electric winders, which enable the cages to be wound at a higher frequency and with great flexibility. This typifies the aim of the Board to electrify all pits as circumstances permit. Among the extensive new roadways constructed underground at Mid-Cannock Colliery was some 2,750 yards of locomotive tunnel of similar dimensions to that at Littleton.

Acknowledgments

We would gratefully acknowledge the assistance which we received from Mr. P. G. Innel Clement, Public Relations Officer, West Midlands Division, National Coal Board and from Mr. T. Fowke, Manager of Mid-Cannock Colliery in the preparation of this article, and would thank the following for permission to reproduce certain of the photographs used:—Figs. 2 and 3—*The Walsall Observer;* Fig. 4—*Messrs. Sidney Darby & Son, Ltd., West Bromwich,* and *The Simplex Electric Co., Ltd.*

PROBLEM OF THE COAL INDUSTRY—*From p. 234.*

tain capacity. Progressive exhaustion of what are today considered economically workable reserves will continue.

Because the British coal mining industry is so important, it needs an adequate labour force of the highest quality and a greatly strengthened management, both now and in the future. This industry has a major contribution to make, and offers outstanding opportunities to those who seek to serve and be fully tested in a great basic industry.

The outline given of the industry's problems relating to physical capacity underlines the need for efficiency in the use of fuel. These problems of capacity do not arise from the form of organization of the industry, or from lack of efficiency on the part of management, or from lack of effort on the part of miners. They are far more deep-seated than that. They arise from the inexorable facts of geology. The prodigal use of coal in the past has accelerated the present capacity problems. The prodigal use of coal today adds to the present difficulties, not only of the National Coal Board, but the whole national economy. It will increase the capacity difficulties of tomorrow, just as past carelessness in the use of coal has added to the difficulties of the present. The deficiency between supply and demand is relatively small; its effect is out of all proportion to its size. It is a sad reflection that, in this age of science, we still fail to apply those simple and well-known methods of using coal efficiently which would more than wipe out the present deficiency.

It should be accepted at once and acted upon, that it is a national duty to prevent any waste of coal. The National Coal Board has a national duty to win the coal required. The user of coal has an equal national duty not to waste it. Just as the National Coal Board must plan and work for increased capacity and output, so must the industrial user plan and work to secure full efficiency and economy in the use of coal. If it is accepted, as it must be, that coal is vital to the country's well-being, it should not continue to be wasted by carelessness and inefficiency.

Research in the Coal Industry*

By W. IDRIS JONES, C.B.E., B.Sc. Ph.D.,

Director-General of Research, National Coal Board.

FROM the seventeenth century onwards, with increasing momentum, an enormous amount of labour and patient endeavour was expended on research work on technical, medical and human problems by many individuals, committees and associations for the benefit of the coal industry and its employees. And yet, despite the worthy research efforts for the industry by these diverse agencies, within the industry, considering its size and immense national importance, scientists played a relatively minor part before 1947.

In addition to coal, the coal industry produces gas, coke, tar, benzole, refractories and other products. It is provided with diverse surface plants and transport services and underground machinery and equipment of various kinds. The variety of the coals produced is wide and the coalfields have a very complicated structure, making the problems of the industry even more diverse. The industry is also faced with difficult medical and human problems. Therefore the opportunities for science and research within and for the industry are very considerable.

Science in the Nationalised Coal Industry

The most important single change effected by nationalisation from the scientific standpoint was that science was given direct representation at board level, by the appointment of Sir Charles Ellis, F.R.S., as scientific member. It is not unreasonable to say that thanks to his initiative and inspiration, and the great stimulus given by the National Coal Board and divisional boards and the efforts and team spirit of our staffs, encouraging progress has been made on the scientific side since 1947. This progress has been limited only by the difficulty of recruiting first class scientists and obtaining suitable accommodation. About 140 separate research investigations are currently in progress, including about 40 projects at 12 universities, but excluding the work in the research associations to which the Board subscribe liberally.

Coal Processing

Coal is not only our primary source of heat and power but also an essential factor in the production of metallurgical coke, chemicals, plastics, textiles, etc. The demand for these products is increasing and it is important to enquire as to the part coal will play as a raw material in the future, more particularly in view of the role of petroleum oil as a source of energy, of gas and of chemicals. More attention is being directed to the problem of smokeless fuel production to improve the state of the atmosphere notably in our large and industrial cities and towns, as is evidenced once more by the recent Air Pollution Committee report. Another factor of importance is that high volatile non-caking or weakly caking coals constitute the major proportion of our coal reserves.

Various methods of coal treatment such as thermal decomposition, oxidation, hydrogenation, gasification and hydrocarbon synthesis have been tried with varying success in the past. We are concentrating, at our Research Establishment at Stoke Orchard (C.R.E.I.), on the thermal treatment of coal, hydrogenation and synthesis being economically unattractive on current United Kingdom prices, and gasification being regarded as the primary responsibility of the Gas Council.

Hitherto both the high-temperature carbonization and the low-temperature carbonization of coal have been used extensively, the first mainly for the production of hard metallurgical cokes and the second for reactive smokeless domestic fuels. Features of these processes are set out in Table I.

Both processes require coking coals and these are becoming scarce and expensive to mine. The demand for hard coke and solid smokeless fuel is also increasing. To what extent therefore can we make good and better quality hard cokes by scientific blending of the weakly caking coals with the best coking coals and by improved processing of the second grade coking coals? Can we process low rank coals in such a way that they will serve all the purposes we now associate with high rank coals and give high quality hard cokes and also reactive cokes? How too can we reduce the capital costs of carbonizing plant and reduce the heat losses characteristic of these plants? These are important questions that we are endeavouring to answer at Stoke Orchard.

TABLE I

	High-temperature carbonization	Low-temperature carbonization
Coke yield, cwt. per ton coal ..	13.5	15.0
Coke reactivity (CAB, cu. ft. per min.)	Up to 0.08	Ca. 0.04
Tar yields, gal. per ton coal ..	Aromatic	Paraffinic-naphthenic-aromatic-
Tar production in 1953	2.75 m. tons	8 m. gall.
Crude spirit yield, gal. per ton coal ..	Ca. 2.0	2.5-3.5
Crude spirit production in 1953 ..	106 m. gall.	1½ m. gall.
Gas, cu. ft. per ton coal	Up to 12,500	Up to 4,500

Hard Coke Production

The work at Stoke Orchard aims at using a wider range of coals for classical coke production and at evolving new types of hard cokes. Attention is being concentrated on the fundamental aspects.

It is well known that some coals pass through a fluid or plastic state when heated and the work at Stoke Orchard has shown that there is a direct relationship between this fluidity and the hardness of the resulting coke. It also appears that a certain optimum viscosity must be achieved before a satisfactory coke will result (Table II).

TABLE II
VARIATION OF COKE STRENGTH WITH VISCOSITY

Composition		Volatile Matter % d.a.f.	Minimum Viscosity (poises)	1½ in. Shatter Index
% A	% B			
100	—	—	5,500	79
75	25	—	39,300	84
50	50	34.9	71,000	84
50	50	34.1	444,000	84
50	50	33.4	835,000	77
50	50	34.1	1,510,000	71

If a sample of coal is heated very rapidly to about 400°C. and thereafter maintained at a constant temperature, the viscosity increases at a steady rate, due to a steady increase in the amount of semi-coke produced. Using this increase in viscosity as a measure of the increase in the amount of semi-coke, the reaction velocities and the activation energy, as derived from the Arrhenius equation have been calculated for a number of coals at C.R.E.I. The results agree closely with similar figures calculated by Van Krevelen who measured the volatile matter emission, and show that the activation energy involved is approximately 50 K. cal. mo. (Table III). This is about the same value as that quoted for breaking the C-C bond in the cracking of mineral oil. In the case of coal the reaction possibly involves the separation of a complex attached to the periphery of the graphite like layer structure.

Work at Stoke Orchard has shown also how low and high rank coals, when suitably blended, yield cokes of increased reactivity. Similar effects are obtained when an oxidized second-grade coking coal is blended with the unoxidized coal. The improved combustion characteristics are linked with the more open, unfused nature of the blends containing low rank coals, and other factors. Following this work at Stoke Orchard full-scale trials, using blends of high and low rank coals and

* From the Cadman Memorial Lecture delivered to the Royal Society of Arts on January 19.

using high and medium flue temperatures, are now in progress in the divisions of the Board.

In all oven coke production the products must be of a uniform size and this has led us to a study of crack formation in coke with a view to controlling this factor. Cracks are formed in coke during and after the period when the material

TABLE III

Coal	Coal Rank Code No.	Dry Ash-free Volatile Matter (%)	Agglutinating Value B.S.I.	Temperature Range over which E is determined (°C.)	E (K. cal. per mol.)	Reaction Velocity at 420°C. (1/min.)
1	2	3	4	5	6	7
Maritime ..	301	24.7	27	419 to 448	52.7	0.033
Manvers ..	502	37.2	27	394 to 416	48.2	0.124
Blackwell (blend)	602/401	37.7	20	402 to 422	54.2	0.161
Grassmoor ..	702	40.0	17	405 to 426	47.3	0.175
New Stubbin ..	401*b*	35.1	29	397 to 417	47.5	0.135
Parkgate 6 ..	502	38.5	29	408 to 441	47.6	0.114
Thurcroft ..	401	36.1	24	411 to 442	52.2	0.097
Union	401	31.5	29	419 to 435	46.7	0.048
Winning ..	602	39.6	24	414 to 429	55.0	0.174
Winning Durham (blend)	602/401	37.4	28	410 to 429	54.6	0.119

in the oven is changing from a plastic mass to a brittle solid. The temperature gradients result in the presence of shrinkage gradients extending throughout the mass. An electrical heat flow analogue has been constructed to facilitate the determination of the temperature gradients and heat changes taking place in the ovens. Further light has been thrown by this work on the endothermic and subsequent exothermic changes occurring during the coking of coal.

New Processes of Coal Treatment

Many of the coals from which smokeless fuels and metallurgical coke will have to be made cannot be converted direct into these products, but our research has shown that they can be retreated and briquetted and the briquettes then carbonized. The phurnacite process developed in South Wales is a process of this type but the coal used does not require pretreatment being of the non-caking high rank type. Work is in progress to extend the range of suitable coals of which the nearest are the South Wales, Scotland and Kent coals (volatiles up to about 18%). When these are briquetted with pitch and the briquettes carbonized, they swell, stick together in clusters or even flow into a solid mass. This is due to the excessive agglutinating value of the coal. Research has shown that the agglutination or fluidity can be reduced or destroyed by a relatively mild preoxidation of the coal. We first developed a process involving the use of a rotary retort, but subsequently a new process involving the oxidation of coal by the fluid bed technique developed for catalytic oil cracking, has been brought to a pilot plant stage at Stoke Orchard, treating 1 ton of coal per hour. It is hoped that this process will be in a state which will permit consideration in the near future of possible translation on to the large scale.

The coals which react well to oxidation and subsequent briquetting and carbonizing are limited in number and the product is a closed appliance fuel. But there is a great need for reactive open grate fuels also and the main sources are the low rank, non-caking or feebly caking coals. Processes exist which can convert such coals into smokeless fuels, but they demand either that the coal be in lump form or involve the use of complicated machinery operating at relatively high temperatures. Moreover, they are either discontinuous or require the use of numerous small repetitive units. Modern chemical engineering methods tend towards the single units with high throughputs per unit of reactor volume, and research has therefore been directed in the first place to fluidized carbonization. Various methods of supplying the heat rapidly to the fluid bed have been tried and one involving partial combustion of some of the product char in another fluidized bed would appear to make best use of the favourable properties of fluidized beds, that is rapid mixing and heat transfer and absence of temperature gradients.

Due to the small size of the coal particles being heated and the uniform temperature of the bed, the byproducts are evolved rapidly and suffer very little cracking and polymerisation. Very high yields are therefore obtained and on the basis of current results at Stoke Orchard, Table IV sets out the yields, etc., which might be expected at a hypothetical plant treating 3 mill. tons of coal per annum.

TABLE IV

BY-PRODUCT YIELDS

On Basis of 3 mill. tons per Year Coal Carbonized	
Total Tar	82,000,000 gall.
Liquor	33,000,000 ,,
Tar Composition	
Light Oil	8,000,000 ,,
Intermediate Oil	8,600,000 ,,
Pitch Creosote Fuel Oil	60,000,000 ,,
Low Boiling Tar Acids	5,400,000 ,,
Gas	12,000,000,000 cu. ft.

While much of our effort is directed towards the technical aspects of this process, the more fundamental aspects are not overlooked. Investigations have shown that while minor variations occur between different low rank coals when heated in the range 400-650°C., their rates of decomposition show a remarkable similarity, suggesting that the basic carbonization reactions are the same. The loss in weight is virtually complete after 30 minutes at 400°C., while at 650°C. five minutes is sufficient.

Two main reactions appear to be involved, one being ten times faster than the other, and contributing about 70% to 80% to the total loss in weight. The faster reaction would appear to be concerned with tar formation and the slower reaction with gas formation: this offers interesting possibilities of controlling the gas yield without appreciably decreasing the tar yield.

The product from the fluidized carbonization reactor is a powdered char or semi-coke, and as such it would be quite useless as a domestic fuel. It has therefore to be briquetted or agglomerated. It has no agglutinating value and being highly porous it would require up to 20% of pitch, which is quite uneconomic. The char leaves the carbonizer at a temperature exceeding 500°C., and to cool it down for briquetting and to heat the briquettes up again for carbonizing would be wasteful of heat. Attention has therefore been paid to briquetting at elevated temperatures, using a mixture of pitch and fusible coal as binder. The pitch in this case acts as a flux and extends the range of temperature over which the binder will remain fluid and therefore in a condition to wet the char surface and penetrate the pores. This process has been tried successfully on the small scale at Stoke Orchard.

The two stages of the process so far described, fluidization and briquetting, are capable of expansion to high and continuous throughputs. We are therefore endeavouring to evolve a second carbonizing stage for carbonizing the briquettes in keeping with these and have found that it is possible to reduce the residence time to about 30-45 minutes which compared with 4½ hours in the conventional indirectly heated phurnacite retorts. One way of achieving this is to use hot sand in a fluid or mobile bed as the heating medium. This sand process is now being extended to a larger scale at Stoke Orchard.

The three stage process (fluid carbonization —> hot briquetting —> fluid carbonization) which I have described still has a long way to go before we can be certain of its reliability and economics. We are therefore working on alternative processes using conventional plant. A study of the volatile emission curves of coal and some binders shows that the peak for a bitumen bound briquette is at the same temperature as that for the coal, though it extends over a wider range. In the case of pitch the peaks do not coincide, but if certain chemicals are mixed with the pitch beforehand, the volatile emission curve is reduced and widened in a manner similar to that of bitumen. A soft pitch made by stripping the low boiling material from the tar produced by carbonizing the coal again has the effect of lowering the peak of volatile emission and broadening the temperature range over which volatiles are given off.

Work has shown that briquettes made with the aid of these modified binders can be carbonized without distortion or fusion. This opens the way to immediate development to yield a closed appliance fuel.

It would obviously be a great advantage if the briquetting stage in these various processes could be carried out without using a binder at all and recent work at Stoke Orchard based on a concept of Rhys Jones and R. Gregory has shown that this can be done without resorting to the enormous pressures used hitherto in Germany and elsewhere for brown coal. The

(*Continued on page* 247)

LAYING THE FOUNDATIONS

Points from the discussion on the paper presented to the Manchester District Junior Association of Gas Engineers by E. W. Stevenson, Group Training and Education Officer, North Western Gas Board

Mr. H. R. Goodwin (Stretford) said the scheme of training outlined had been formulated prior to the recommendations put forward in the Beaver Report. Although the Beaver Report seemed far removed from educational and training schemes there could be no doubt that if the recommendations were implemented by the Government many changes would probably come about both in relation to production methods and selling. Emphasis should certainly be placed on the future methods to be employed in selling both smokeless solid fuel in the form of coke, and gas. The Report visualized that between the gas and electricity industries something like 19 mill. tons of bituminous coal would need to be replaced by solid smokeless fuel, gas, and electricity, and it would appear from the Report that most of this displacement would be the responsibility of the gas industry in the form of coke.

Considerable emphasis had been placed on the training of gas fitters, but Mr. Goodwin felt that too little consideration had been given to the proper recruitment and training of salesmen. In all probability the replacement of the vast quantity of raw bituminous coal now being used in domestic appliances would take place over, perhaps, a period of 10 to 15 years, and it would be logical to suppose that over this period of time the additional carbonization of coal on gas-works would give rise to a proportionate thermal output in the form of gaseous fuel. Assuming this to be correct it would be obvious that a considerable amount of thought would need to be given to the question of both domestic and industrial gas output; otherwise the added production of gas coke would need to be restricted to an extent which would fall in line with consumer demand for gas.

Mr. J. Pickles (Barrow-in-Furness) asked what happened if gas fitter apprentices, after successfully passing a six months' probationary period, failed in their examinations.

Mr. Stevenson, replying, said the system was such that this should not happen. The educational test doubly ensured that apprentices would be capable of passing the examinations. If they passed the preliminary test and interview satisfactorily, it was felt that they would make the grade. They had six months to change their minds.

Mr. J. Pickles (Barrow-in-Furness) asked about the boys who were apprenticed before the new scheme was adopted, who were still going to school and who did not pass.

Mr. Stevenson said a certain number of boys would never pass the examinations and steps would have to be taken to see if they could be asked to seek other employment. This only applied to boys who did not pass the intermediate examination. If retained, they would be able to secure the status of second-class fitter at 21 years of age, but generally speaking, if they could not pass the examinations, they were of no use to the Board. There was one exception. A certain number would be required as maintenance fitters from among those who would do the practical work, but could not master the simple calculations necessary to pass examinations. They could not, however, obtain the first-class fitter's rate of pay. Steps would be taken to consult the general manager on such cases. He would say that the National Joint Industrial Council for the Gas Industry should allow two attempts at the intermediate examination and three only in special circumstances.

Mr. A. J. Abley (Preston) said that as appliance manufacture and design were included in the syllabus of the Institution of Gas Engineers Examination in Supply, he thought it essential that a proportion of sales staff should obtain this qualification.

Mr. Stevenson said there was no objection to any salesman attempting to pass the Associate Membership Examination but the way was long and difficult. A consumer service course was the correct and proper procedure, and personnel should be encouraged to take this course, which included utilization of gas and a section on distribution.

Mr. Poole (Fylde Group) referred to a trade union circular which stated: 'Do not let your boy go into the gas industry, as when he reaches the age of 20 he may be dismissed.' He agreed with Mr. Goodwin's remarks about salesmen, but were they to wait a period of seven years before anything was done? Could they not produce some snap courses?

Mr. Stevenson said the implications in the circular were erroneous, as apprentice gas fitters attaining the age of 20 years would not be dismissed if they had proved satisfactory.

With regard to the boys who were not going to make the grade in gas fitting, it appeared to him that their future should depend on the amount of ability they possessed and whether they could usefully be employed in some other capacity.

Snap courses were already being organized throughout the Board's area. During the period between May and September, when the apprentice gas fitters were receiving district training, refresher courses for experienced gas fitting personnel would be run, and it was intended that a course for appliance maintenance men would also be arranged during the summer months. Short courses for salesmen had taken place during the past year, and at the present time a two-weeks' salesmen's refresher course was being run at Hollinwood in the Central Lancashire Group. This course included brief instruction in the use of domestic appliances and sales technique, aided by dummy tests which were recorded and played back on a tape-recording machine so that those taking part could benefit by listening in to their own technique. It was intended that this type of refresher course would be held periodically.

Mr. N. Cooper (Stretford) referred to those not fortunate enough to be selected for the sandwich course in gas engineering. They were faced with a tough proposition. There were two more Ordinary National Certificates to obtain, electricity and chemistry, as well as ancillary subjects. Could any course be provided for those who had passed the Ordinary National Certificate to reduce the intervening time until passing the Associate Membership Examination? It took about eight years, with, in addition, two years for National Service.

Mr. Stevenson said the Institution of Gas Engineers was fully aware of this position, and had recommended that a suitable method of obtaining the Associate Membership Examination was to take the Ordinary National Certificate followed by the Higher National Certificate in Mechanical Engineering, in conjunction with additional ancillaries and the main subject, gas engineering—manufacture or supply. For students with a G.C.E. in maths, science, chemistry and English, it was possible to obtain the Ordinary National Certificate in two years, and after a further two years, the Higher National Certificate. The additional ancillaries such as applied chemistry, engineering materials, principles of electricity, together with the main subject of gas engineering, manufacture or supply, could be obtained in an additional two years, making a total of six years. For students studying by way of the Ordinary and Higher National Certificates in Chemistry, discussions were now taking place between representatives of the Institution of Chemical Engineers and the Institution of Gas Engineers in regard to the mutual acceptance of their respective Associate Membership Examinations.

Mr. L. G. Townsend (Liverpool) said in the first place the paper only described the academic life of qualifying in the gas industry, and it was very noticeable that no mention had been made of steps being taken to look after the general spiritual welfare of apprentices, which seemed to be an important

(*Continued on page* 247)

Underground Pipeline Corrosion . . .

Points from the discussion on the paper presented to the Wales and Monmouthshire Junior Gas Association, North and South Wales Sections, by John F. Day, Technical Assistant to the Distribution Engineer, Wales Gas Board.

Mr. H. Potter (Barry) asked if the method of protection could be applied to mains or services in built-up areas.

Mr. Day replied that cathodic protection could be applied to mains and services in built-up areas, but not without close liaison with other public service authorities, for while satisfactory protection could be guaranteed on the underground gas carrying structure, the current flow necessary to achieve this might result in increased corrosion on neighbouring buried structures. The protective current would naturally take the path of least resistance to pass from the anode—*i.e.*, ground bed, which might include passage into a neighbouring metallic structure—causing a cathodic area to be formed—and naturally passage from it, where an anodic area would be formed and increased corrosion of the structure at such an area would inevitably result. The presence of a protected structure near to a non-protected structure could also result in a greater rate of corrosion of the latter than if both were unprotected. The need for liaison had, of course, been recognized and a national joint committee consisting of all interested parties had been formed to establish codes of practice.

The real factor of importance when applying cathodic protection to a structure in a built-up area was to ensure that the potential of all neighbouring structures was not altered by more than a certain fraction of volt—yet to be decided by the joint committee—as a result of the application. Thus the exact location of all adjacent structures must be ascertained and many check readings taken on such structures.

Mr. Potter asked if it was true to say, therefore, that cathodic protection was difficult and expensive to apply in built-up areas and was generally more suitable for application in open country, for instance on grid mains.

Mr. Day was of the opinion that this was generally so, but mentioned that magnesium anodes could usually be employed in built-up areas of suitable soil resistivity without detrimental effects on neighbouring structures, for the current outputs of each anode were relatively low and of limited spread, but impressed current systems involved much larger current flows which might constitute a widespread danger to adjacent structures.

Mr. M. F. Scott (Wales Gas Board headquarters) asked what the capital cost of an impressed current system would be for a grid scheme which was being laid in open country.

Mr. Day emphasized that the cost of cathodic protection was a function of the area of bare metal to be protected. Therefore, it was dependent upon the standard of coating on the pipeline to be protected and on the diameter of the pipeline. If a very high standard of coating were achieved on a small diameter pipeline it might be possible to protect over half a mile of pipeline with one magnesium anode at a cost of under £10. Running costs on such a protection would be very small. However, if a poor standard of coating were achieved on a larger-sized pipeline, an impressed current system of protection would be necessary and while the capital cost of the equipment required was of the order of £200, the overall capital cost might be increased by the cost of bringing an electrical supply to the transformer/rectifier unit. The length of pipeline protected would be dependent on the actual standard of coating and resistivity of the soil through which the pipeline was laid and might vary from five miles or more to half a mile or less. It would be difficult to give more accurate figures. The running cost of impressed current systems would be largely accounted for by the purchase of electricity at about £50 per kW per annum. Generally speaking, the capital cost of cathodic protection should always be under 1% of the capital cost of the pipelines and for well-coated lines it should only be a fraction of 1%.

Mr. Scott said he thought it was important that the type of coating used should be such that it would last the life of the pipe, otherwise if the coating broke down before the pipe had served its useful life the current required for protection would be excessive. Could Mr. Day give details of the coating he had in mind when he spoke of 'a high standard of coating.'

Mr. Day agreed that if an effective coating broke down, current requirements for protection would increase, but he thought it should be emphasized that cathodic protection would materially assist in preventing coating break down, for corrosion products invariably caused this by expanding and lifting off the coating. If cathodic protection were applied, no corrosion products should be formed to cause damage in this manner. The best coating for pipelines was undoubtedly either a suitable grade of bitumen or a plasticized coal tar enamel applied to a compatible cold-applied primer on a descaled metal pipe surface, into which was pulled a fibreglass wrap with phenolic resin to ensure adhesion between glass and enamel. Fibreglass was non-wicking, non-organic, and virtually indestructible, and possessed adequate tensile and shear strength to render the coating resistant to impact.

Mr. S. G. Meade (Newport) asked if structures other than pipes could be protected, having in mind gasholders, etc.

Mr. Day stated that cathodic protection had been applied to condensers and gasholders in this country, and to many other structures which were pemanently in contact with soil or water to conduct the current—*e.g.*, jetties, mooring buoys tank bottoms, pylon bottoms, etc. It would be true to say that the application to condensers and gasholders who partially experimental but the results were promising and no doubt the practice would be extended in the future. So far as he was aware only the cup and grip regions of holders had been protected in this country and no attempt had been made completely to place all the metal in contact with the water under protection. This would obviously be difficult for the amount of metal to be protected would vary with holder position. It was problematical whether sufficient electrolyte volume would exist to provide uniform current spread, and one lift might screen another or the tank from protection when a holder became deflated. Probably water conditioning and bonding of lifts and tank were more promising channels for attention to reduce holder corrosion at present.

Mr. C. G. Reeve (Wales Gas Board headquarters) asked if Mr. Day could give some indication of the current costs for a well coated pipeline.

Mr. Day said this was difficult as he had indicated in his reply to Mr. Scott, but, as a hypothetical case, to protect adequately a five mile length of well-coated 12 in. line might take six amps at 12 volts, 24 hours a day, 365 days a year. Taking the efficiency of a transformer/rectifier unit at 50 per cent. and electricity purchased at £50 per kW. per annum, Mr. Reeve could calculate the costs to be small.

Mr. A. Saunders (Wales Gas Board—Eastern Grid) asked Mr. Day if any work had been done on the treatment of pipes with a metal surface to resist corrosion.

Mr. Day replied that he had very limited knowledge of this form of protection, but he was aware that galvanizing of service tubes had not always produced results consistent with basic theory and reverse potentials had been discovered which were difficult to explain.

Mr. S. G. Meade asked what steps were taken to ensure electrical continuity at joints in which a rubber ring was used

a seal. He had seen some special rubber joint rings for hnson couplings which incorporated a brass spiral insert ich, when compressed, contacted centre register and pipe.

Mr. Day said they had had some of the special rings under t actually, but they had found that while contact was good most cases, it had been proved that it was not always 0 per cent. Since lack of electric continuity in a pipeline uld seriously jeopardize the success of a protection system it d been decided to bond each joint using tackwelded 1 in. y ½ in. steel strip. Similarly, the lead tip of the sealing ring sed with spun iron pipe joints was not too reliable and onding of such joints was again to be recommended.

Mr. J. H. Chapman (Chairman of the Wales and Monmouthire Section of the Institution of Gas Engineers) asked what steps, if any, were being taken to ensure that underground structures of other public services would not be damaged. He understood that as a first step to ensure cathodic protection costs were low, a Holiday detector should be used to detect flaws in the coating, but he would be glad if Mr. Day would state where the detector should be used.

Mr. Day replied that prior to bringing a system of protection into operation, notices would be sent to all other interested parties giving details and the location of the protection unit. He explained that a Holiday detector was an instrument which enabled a voltage of the order of 10,000 to be applied between a travelling spiral metal ring wrapped around the coating and the pipe. Where a fault occurred sparking took place, which could be seen and heard. The instrument should be used on the pipe above the trench immediately prior to lowering.

Mr. R. Hanford (Wales Gas Board—Western Grid) asked if corrosion would take place under bubbles in the coating where air was trapped between the coating and the pipe and whether cathodic protection would prevent such corrosion.

Mr. Day said corrosion would occur if moisture were present but would cease if the bubbles were completely sealed when the oxygen and moisture were exhausted. If the bubbles were sealed with coating material protection could not be afforded to such spots.

Mr. Scott asked about the measures necessary to ensure that current flow was adequate but that no current was being wasted after a system of protection had been put into operation. He had in mind variations in pipe to soil potential due to periods of wet weather.

Mr. Day agreed that variations might occur, but usually soil was always sufficiently wet to conduct current and ground resistance was therefore more dependent on the amount of dissolved chemical in the soil. He would recommend a three-monthly check of pipe to soil potentials on a line that was under protection.

Mr. Reeve asked what use could be made of sacrificial anodes and what were the comparative values of both systems of protection.

Mr. Day replied that magnesium anodes were useful to protect small areas of bare metal in environments of comparative low resistivity—*i.e.*, below 2,500 ohm-cms. Current flows of between 50 and 100 milliamps per anode could be obtained, but greater current outputs could be obtained in very low resistivity environments—*e.g.*, sea water. The impressed current system was generally preferable if long lengths of pipeline required protection, for otherwise a large number of anodes would be required.

Mr. Potter asked if protection could be afforded to steel services.

Mr. Day said services could be protected ideally by the attachment of a small sacrificial anode; in fact it was the practice of an American gas company to put such an anode on each new service laid. Care would have to be taken to isolate a steel service from a spun iron main by an insulating flange, and perhaps an insulating flange would be necessary at the other end of the service if electrical continuity were possible through a water heater to a water service and consequently water main, otherwise the small sacrificial anodes would be attempting to protect an enormous area of exposed metal.

Mr. K. Muir (Wellington Tube Co.) proposed a vote of thanks to Mr. Day for his informative paper and remarked that in Wales as a result of almost 100% integration it was to the distribution side that they could look for reductions in the price of gas per therm. **Mr. D. Egan** (Newport) seconded.

RESEARCH IN THE COAL INDUSTRY—*From p. 244.*

resulting briquettes are very strong and those made from the low rank feebly-caking coals on carbonization yield products of even greater strength. The possibilities of this process in conjunction with the other techniques I have described are considerable; conjointly they would appear to be capable in due course of solving the problems of limited availability of large coal and of coking coal for the production of metallurgical coke and smokeless fuels.

Considerable effort is being put into all this work at Stoke Orchard and the results have shown that it is possible to a marked degree to control the yields and types of solid, liquid and gaseous products resulting from coal pyrolysis, and to produce 'tailor made' smokeless fuel for open or closed domestic appliances and metallurgical cokes, from low rank coals.

A possible application of fluidized carbonization also is in the pretreatment of coals for pulverized fuel boilers, the char being fed to the boilers and the tar, gas and liquor treated separately.

Conclusion

The winning of coal is continually becoming more difficult and costly as the shallower seams are being worked out and manpower is becoming more expensive, and increasing regard is rightly being given to the miners' safety and working conditions. The requirements for coal utilization are also becoming more stringent; greater efficiency of use and minimum pollution of the air have to be attained despite the inevitable reduction in availability of the most suitable natural coals. Research and development on a large scale alone can reconcile these inevitable trends and while virtually a beginning only has been made, our achievements justify a quiet confidence in the eventual attainment of our goals.

Both at Littleton and Mid-Cannock Collieries the work of driving underground roadways, both locomotive and others, is a continuing process. The Mid-Cannock re-organization scheme also involves the driving of a two-miles long tunnel through an unproductive area to reach further large quantities of coal. In due course this coal will compensate for a loss of output that will result when certain areas at present being worked from Cannock and Leacroft Colliery become exhausted. Whereas output at Mid-Cannock Colliery in 1947 was 217,000 tons with an overall output per man shift of 22.6 cwts., in 1954 the output totalled approximately 568,000 tons with an overall output per man shift of 30 cwts. Output in 1955 is expected to be about threequarters of a million tons.

LAYING THE FOUNDATIONS—*From p. 245.*

aspect. He thought it most essential to run events like summer camps for apprentices.

A further point was that chemical engineers and chemists (of which there were a large number) did not appear to be sufficiently assisted by the new scheme. It is quite true that facilities were available for training them for the A.R.I.C., but so far as was known they had to arrive there the hard way. Was there any question of a sandwich course for these employees? For gas engineers the scheme was a most admirable one, but other specialists had had little provision made for them and the attention of education officers should be drawn to this.

Mr. Stevenson replied that the varying religious denominations to which employees belonged rendered it difficult to introduce a scheme of spiritual welfare acceptable to all. He entirely agreed, however, that every effort should be made to improve the employees' welfare generally, and this matter had recently been considered at the group officers' meeting. While it was desirable to provide recreational facilities, the whole question required careful organization and expenditure, bearing in mind the heavy cost to the Board in implementing this training and education scheme. The availability of finances must be considered, and the social aspect must be kept in its right perspective.

They had no sandwich course for chemists as for gas engineers, but were prepared to grant additional facilities to suitable students in chemistry.

GAS CONSULTATIVE COUNCILS

Scottish Projects

Four-figure projects approved by the Scottish Gas Board in the last three months of 1954 totalled over £420,000 it was reported at a meeting of the Scottish Gas Consultative Council held in Edinburgh on January 19. The figure for the whole country was £420,483. The divisional figures were: South Eastern, £61,710; Central, £37,412; Northern, £12,898; Lanarkshire and South West, £308,463.

The largest single district total was that for Kilmarnock, £168,130, of which £160,000 was accounted for by the provision of a new 2 mill. cu.ft. spiral-guided gasholder. The additional cost involved in laying 12-in. main from Kilmarnock to Hurlford in substitution of the 8-in. main already authorized in connection with gas supply to Galston, Newmilns, and Darvel, was given as £5,869. Newton-on-Ayr, also in the Kilmarnock group, had a projects total of £42,324. The chief item in this list was a sum of £36,027 of additional cost in connection with the erection of a 3 mill. cu.ft. gasholder. This was authorized in 1951, since when variations have taken place in prices, including a rise in the cost of steel of approximately £15,000. Also in the Newton-on-Ayr district were: replacement of waste heat boiler, £6,297; repairs to No. 2 gasholder, Stranraer, £5,000. To complete the Kilmarnock group total of £235,754 was a sum of £20,300 for the Ayr district—for the laying of 3,784 yards of 12-in. main and 884 yards of 10-in. main from the works to Forehill district. About 2,550 houses have been scheduled for the Forehill district and adjacent areas. The pressure in these areas is down at peak periods to 2 in. and the existing main will not meet any further demands. It is therefore proposed to lay a new 12-in. and 10-in. trunk main from the works direct to the heart of this housing development area, and the opportunity will be taken to connect into the mains en route in order to improve pressures which at present are far from satisfactory, particularly at peak load periods.

The western group in the South West Division has a total of £39,210, which includes: Johnstone district, mainlaying proposals to service the Beith Mains Farm housing scheme, 350 houses, £8,900 (this includes a feeder main costing £2,293 which will also augment the existing small mains which are fully loaded, with consequent reductions in pressure at peak times); Paisley district, mainlaying proposals to service the Foxbar housing site, 3,660 houses, £26,239 (the ultimate extension of the H.P. main envisaged will leave only a gap of 2,350 yards to complete a high pressure ring main round the Paisley area of supply).

The Lanarkshire Division put forward a list totalling £33,499, chiefly for mainlaying proposals in the Airdrie and Lanark districts. The following item, however, appeared in the Motherwell district list: 'Acquisition of a travelling showroom with a view to combating efforts made by the South Western Electricity Board to boost the sale of domestic electricity in the area, £1,500.'

The South East Divisional total of £61,710 was chiefly marked by the figure of £52,800 for the Falkirk district (laying of sections of inter-linking mains between Falkirk, Denny, Grangemouth, Bo'ness, Linlithgow, and Polmont).

The meeting of the Consultative Council considered a letter from the Glasgow branch of the Clerical and Administrative Workers' Union which referred to the incidence of gassing accidents recently. At a previous meeting the Council had discussed the possibility of safety cut-off valves being fitted to gas equipment.

It was intimated that the Scottish Gas Board had informed the Council that there had been only a very small number of accidents where such a valve would have served any useful purpose, and that the cost of supplying such a valve to existing prepayment meters would cost an estimated £1,200,000. Moreover, the whole question was being considered at present at national level.

Members of the Council pointed out that relatively few accidents were caused by gas. One member thought the manufacturers might be approached with a view to incorporation in new equipment of the valve, which disconnects the supply of gas when the flame is accidentally extinguished.

It was decided that before further action was taken, the Council should await the report on the present discussions on the matter.

West Midlands Industrial Load

Increasing quantities of gas continue to be used for industrial purposes in the West Midlands area and this, coupled with the recent severe weather has resulted in fresh high levels of output. This was reported to the West Midlands Gas Consultative Council at a meeting in Birmingham on January 17 under the chairmanship of Alderman W. H. Malcolm (Coventry).

Mr. G. le B. Diamond (Chairman of the West Midlands Gas Board) told the Council that the onset of winter had already brought about record outputs of gas in a number of districts in the area, including Hereford, Stoke, Bilston, Kiddermister, Newcastle, Solihull, and Smethwick. First reports indicated that gas sold in the area as a whole in the week ended 6 a.m. on January 16 was approaching the previous record set up in February, 1954.

The total gas distributed since April 1, 1954, was 6.7% greater than in the corresponding period a year ago and reflected the rise in industrial production, since half the gas sold was for industrial purposes. If the cold weather continued, he said, the Board's gas making facilities would be fully extended even though in the nine months ended December new plant had been installed which would provide an additional 16½ mill. cu.ft. of gas per day.

Coal stocks stood at 313,000 tons on January 9, equivalent to 3.9 weeks winter consumption and coke stocks were 68,000 tons. These quantities were barely sufficient for a normal winter and difficulties could arise if a prolonged cold spell was encountered.

Mr. Diamond pointed out that the figures represented the highest increase in gas production in any gas board area in the country at present.

Asked about coal stocks Mr. Diamond said the position was better than they had expected it would be but the national position was bad and stocks were made up by the importation of coal. In the West Midlands they had a good deal of German coal and they were now importing American coal. They liked to have four or five weeks supplies in hand at this time of the year.

Reference was made to the retirement of Alderman P. Williams (Stoke-on-Trent) from the council.

Alderman Malcolm said he had retired altogether from public life and had gone to live at Rhos-on-Sea. He paid a tribute to his work on that Council and in public life generally. He had already written to him but a further message of goodwill was sent from the Council.

Three churches in Leek wrote asking for consideration of present gas prices. The Chairman said the Board could not comply with the request and it had been intimated that as in other cases the Board was precluded from giving undue preference to any person or class of persons.

Cheaper Gas for Wales

The Wales Gas Consultative Council, at a meeting at Shrewsbury, approved a new general scale tariff for undertakings receiving or about to receive bulk gas supplies, which, it was stated, would benefit at least 95% of consumers in Wales.

In a report to the Council, the Wales Gas Board said the introduction of the new tariff would result in concessions in the majority of undertakings, while in one or two cases, an increase would result for those consumers who formerly enjoyed very low rates. Many anomalies would be eradicated, however.

It was agreed that the tariff should be reviewed in a year's time.

THE FIGHT FOR COAL

London Juniors Descend Deep Mines to See it for Themselves

TO see at first hand the coal they help carbonize won from the earth, 35 members of the London and Southern Junior Gas Association—including two women—donned miners' helmets and descended deep pits in the Cannock, Staffordshire, area last Thursday. Dividing into two parties, one party saw the 75-years-old Littleton Colliery and the other visited Mid-Cannock Colliery.

After travelling from London by train, they were met at Wolverhampton by coaches, and after lunch found their way to the pits where they changed into a hilarious collection of old clothes they had brought with them. This was according to instructions and those who had smart boiler suits were not considered to be playing the game. First prize in a competition would have gone to an eye-catching baseball jacket worn by a member.

By COLIN GODBOLD
'Gas Journal' Staff

Matches—10/- a Box

However, most of the members had not been down the pits before, and to them the business was very serious. In the group I was attached to—the Littleton Colliery one—someone entered the shaft area with a forgotten box of matches in his pocket. The pit safety officer who escorted us was delighted to tell us: 'If the lads do that they pay a ten-bob fine.'

This reminded us that we were about to witness men engaged at one of the most hazardous of occupations—an industry not only associated with dirt and discomfort, but with the need for courage.

Our own courage was tested a little by the nerve-shattering spectacle of watching double-tiered 'cages' descend the 1,000-ft. shaft apparently like dropping plummets. But we were assured that the speed humans are allowed to travel at is much lower than the speed for transporting materials. Each of the two decks of the cages can carry four 'tubs' or underground wagons or up to 20 men. We stepped inside the cage—conscious of the blackness below, turned on our cap lamps and waited for our heads to hit the roof. In fact it was not so bad after all.

The winding apparatus familiar in its contour to us all as symbolic of a mine, stands over two shafts in a mine, their purpose being to convey men, materials and air up and down. Appropriately they are called the up and down cast shafts, the former having a power driven fan which sucks air out of the mine. The vacuum this creates draws fresh air down the other shaft.

The two ladies in the party were Miss M. Godby of the Women's Gas Federation and Miss A. Badcock, of Watson House, and they presented an excellent case for equality when the going became rough.

A visitor to a mine is always greatly impressed by the emphasis on safety. It is placed above every other consideration, so these days a miner has to have a lot of intelligence as well as courage and stamina. No matter in what capacity an underground man works, he has a powerful cap lamp to fit into his lightweight helmet. This is handed in after a stint and is taken as a record of his having emerged safely. If the lamp attendant misses a lamp in the rack, the alarm is raised.

The first part of our tour was to a group of 'head-men,' who were blasting and cutting a new roadway through the rock in order to meet the seams. An automatic clearing machine, made solely for this purpose, threw the smashed rock back on to neat heaps for later removal. I was told later that it was costing £31 a yard to move forward in this way.

Foreign Labour

While another of our guides, the pit training officer, was talking, I moved over to three of the men engaged on this operation. Two of them were Poles who had done similar work in East Germany. They appeared to be proud and knowledgeable in their work. I learned that there are 212 workers of foreign origin in that pit. They include some of the Italians who came to the mines under the scheme that was at first treated hostilely by British miners. The third man I spoke to was 57 years old—he had started in the mines at 13—and he was anxious to stress the change in working conditions he had experienced. He said he no longer worked at the coal face on account of his age. So cutting through rock was less arduous than fighting for coal!

The Juniors were very interested in the coal conveyance tipping tubs. These, of course, run on the underground rails, can be run straight on to the lifts, and out at the surface. They carry 10¼ cwt. of coal. Widely used for hauling tubs are diesel locomotives like the one we saw. It had 70 h.p., weighed 10 tons, and was made by the Hunslet Engine Co., Ltd., of Leeds.

Less comfortable to visit was an actual face working. After a long walk, we descended a steep slope in pitch darkness to one of the face workings, stumbling over pit props, worming past coal and shale tubs, and sliding on muddy surfaces. At last we turned into a narrow seam with only four feet headroom. In the light of our cap lamps the roof looked grey and oppressive, the thousands of tons of rock above it being supported by only cleverly wedged steel and wooden props. Ahead, the narrowing seam was pricked with dots of light from the face-workers' lamps, but we were not allowed to get nearer.

The Coal Cutter

Most miners in thin seams work on their knees, which have to be protected with crawling pads. This was a mechanized pit, in which the men on morning shift shovelled the coal on to the conveyor while the other two shifts prepared for this operation. They move the conveyor forward to the new face, put in new props and clear the way for the coal cutter. This machine cuts a long slot between five and six feet deep with a metal arm around which is a chain fitted with teeth. This moves rapidly, cutting as a saw does. Lastly, they drill five-ft. deep holes with portable electric drills ready for explosive charges.

In some ways the group of Juniors who saw the Mid-Cannock pit were the more fortunate. Not only did they see the famed pit-ponies at work, two of which were in the Great Windsor Horse Show, but a blasting operation actually took place while they were in the mine. In both road-head blasting of rock and coal excavation, the procedure is more or less the same. The men retire from the tunnel, when the fuses have been set, and an explosives expert fires off the charge from a vantage point at the side of the tunnel. The Mid-Cannock party were also impressed with a 'Joy-loader' which has a remarkably human appearance as it claws with jointed arms coal on to the conveyor.

Grimy-faced, we emerged at the same speed with which we had descended, to enjoy the pit-head shower-baths. Unfortunately, there was not even time to take tea at the canteen before being taken to our train for London. The whole trip was organised by the London Juniors themselves with the co-operation of the Midland Juniors who sent a message to the restaurant where we lunched, welcoming us to Wolverhampton.

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The consumer these days is inclined to look upon space heating by Gas Fire, though eminently desirable, as rather a luxury.
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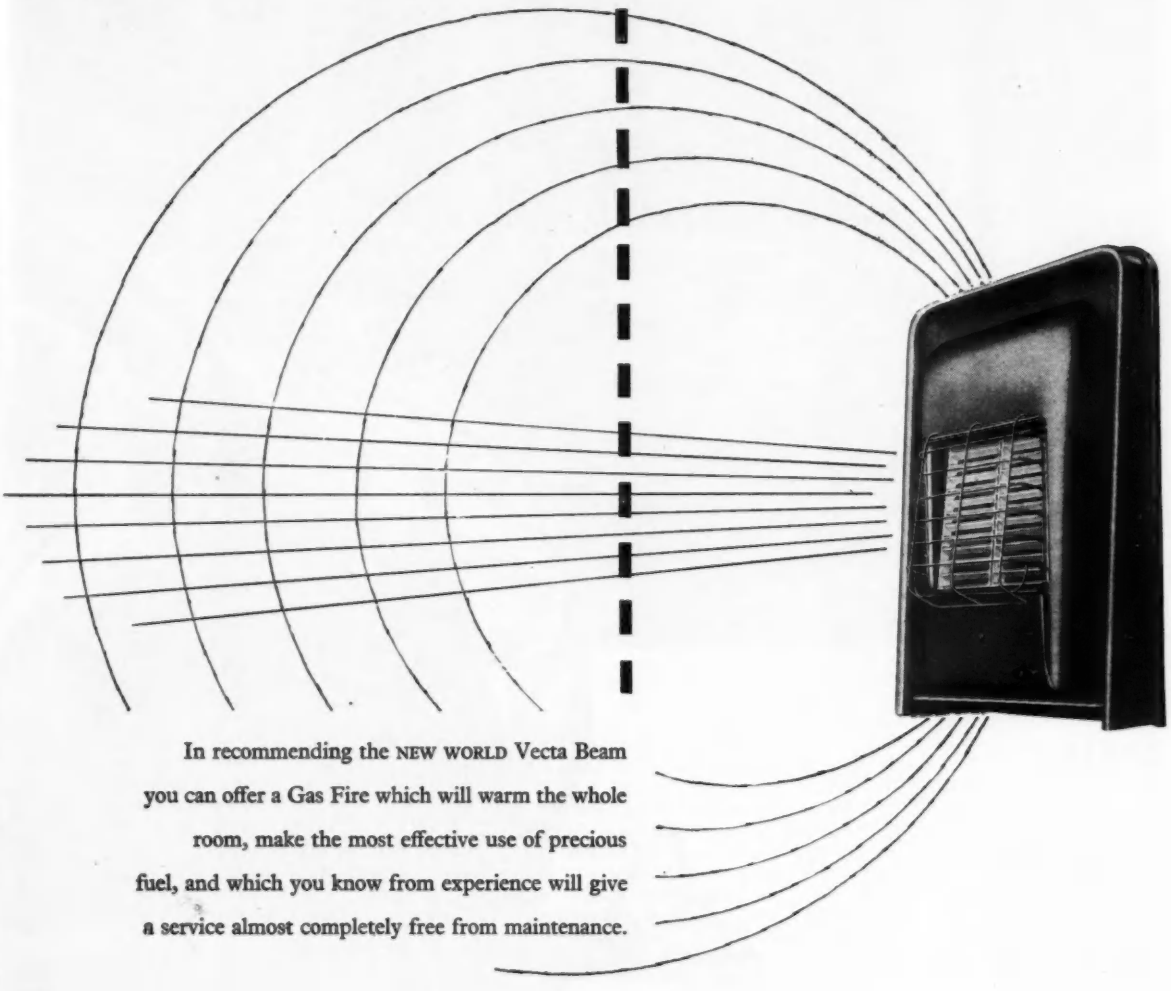

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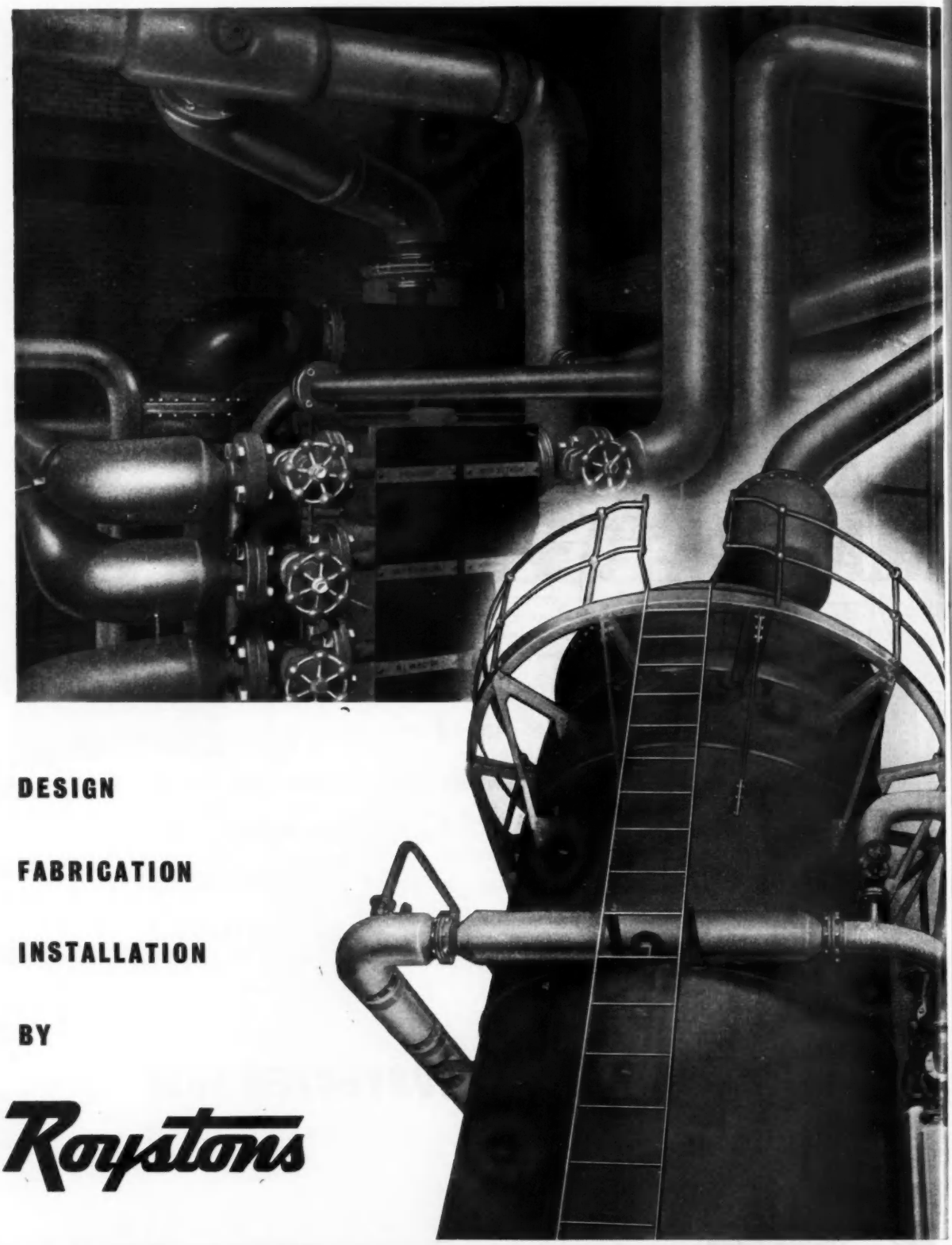

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British Industry Buys More Gas

North West Shows an Increase of 13%

During the September quarter the gas industry sold 534 mill. therms of gas. This was 5% more than the total of 508 mill. therms sold in the corresponding quarter of 1953. Total sales in the first half of the financial year 1954-55 (the six months ended September 30) amounted to 1,155 mill. therms, an increase of 4½% over the same period of the previous financial year. Sales figures for October and November are not yet available, but the trend of gas supply indicates that sales in October were about the same as in the previous year while in November there was a rise of about 5%.

The quarterly *Bulletin* of the North Western Gas Board states that in the North Western area gas sales in the September quarter amounted to 74 mill. therms and were up by 4½% compared with the total of 71 mill. therms sold in the September quarter of 1953-54. Total sales during the first half of the current year, at 154 mill. therms, were up by nearly 5% compared with the total of 147 mill. therms sold in the first half of 1953-54. Gas supplied during October was approximately equal to the amount supplied a year earlier, while in November gas supply was up by 4½%.

All-Round Increases

The main increase in national sales during the September quarter occurred in industrial sales which amounted to 150 mill. therms compared with 137 mill. therms in the September quarter of 1953-54 (increase of 9%). Domestic sales, at 301 mill. therms were up by 2½%. Sales to commercial consumers, at 66 mill. therms, were up by nearly 10% and sales to Government premises and for public lighting, at 16 mill. therms, were up by 1%.

Analysis of sales in the first half of the financial year shows a similar picture, with industrial sales at 319 mill. therms, up 8½%, domestic sales at 640 mill, therms, up 2%, and commercial sales up 9½%.

In the North Western area the main sales increase in the September quarter was also in industrial sales, which amounted to 21½ mill. therms compared with 19 mill. therms in the same quarter of 1953-54 (up 13%) Domestic sales, at 40 mill. therms, were up by 0.5%, sales to commercial consumers, at 10 mill. therms, were up by 3% and sales to Government premises and for public lighting, at 2½ mill. were up by 14%.

During the first half of the current year, industrial sales amounted to 45 mill. therms and were up by 13% compared with sales in the first half of 1953-54, while domestic sales, at 81 mill. therms were up by 1%, and commercial sales up 3%.

The average price of gas in the industry as a whole during the September quarter was 16.61d. per therm; 0.2% less than the average for the previous September quarter. The reduction in average price was accounted for mainly by a fall in the average for industrial gas to 12.05d. per therm, compared with 12.17d. per therm a year previously (fall of 1%). The average for commercial users, at 16.67d. per therm, was also slightly less (0.2%) than in the previous year, while the averages for domestic prepayment and credit consumers at 19.13d. and 18.77d., were respectively 1.1% and 0.6% higher than in the same quarter of the previous year.

In the North Western Area the average price in the September quarter, at 16.81d. per therm, was 2.4% below the corresponding average for the previous year. Gas tariffs in the North West have not been changed since March, 1953, and apart from the limited effect of some new special agreement provisions for industrial consumers using gas throughout the week, the fall in prices has been due to higher consumption per consumer which automatically reduces the price of gas on the block tariff. The sharpest fall in average price (4%) occurred among industrial users, where the rise in consumption has been greatest, but the price to domestic credit consumers and commercial users has also dropped by more than 1%.

Analysis of Coke Sales

An analysis of coke sales in the first 32 weeks of the current financial year shows that 4.9 mill. tons were sold inland and 385,000 tons were exported. Compared with the corresponding period of the previous year, inland sales were up by 0.4%, exports up 23%, and total sales up by 2%. Within the total of inland sales nearly 3 mill. tons went to merchants for re-sale to consumers, 500,000 tons to domestic users, 800,000 tons to industry, and 600,000 tons to non-industrial premises. Domestic sales were up by some 51,000 tons (12%) and sales to merchants showed an increase of 33,000 tons (1%) compared with sales in the same period of 1953-54. Sales to industry and to non-industrial users were down by 5% and 3½% respectively.

In the North Western area coke sales amounted to 830,000 tons, of which 743,000 tons were sold inland and 87,000 tons were exported. Inland sales were up 6%, exports up 24% and total sales up 8%. Sales to merchants, at 329,000 tons, showed an increase of 4½%; domestic sales were up 14%, industrial sales up 3%, and non-industrial sales up 9%. The fact that by far the largest percentage increases in inland sales, both nationally and in the North Western area, took place in direct domestic sales, while sales to merchants were also well maintained, suggests that the use of coke for room and water heating is increasing. The removal of restrictions on domestic coke sales, together with intensive advertising, have helped to bring about this increase.

Appliance Sales

September quarter sales of appliances in the North West reflected some slackening in the overall sales increase. Total sales at 56,000, were up 15% compared with the previous year's total of 49,000. Cooker sales, at 32,000, were up 5%; wash boiler sales, at 7,700, were down 11%; and sales of all other appliances, at 16,200, were up 65% compared with sales in the previous September quarter. The increase in water heater sales narrowed to 50% (6,600 compared with 4,400), but the rise in sales of space heaters was more marked than in the June quarter (up 55%) while washing machine and refrigerator sales, at 4,400 and 900 respectively, were between three and four times higher than in the same period of the previous year.

October sales amounted to 21,028 appliances and were down by 11% compared with the record level of October, 1953, but preliminary figures for November show a substantial increase in sales compared with November 1953.

The Chemical Engineer

Eleven Western European countries are expected to take part in a conference on the functions and education of the chemical engineer in Europe organized by the Institution of Chemical Engineers, to be held at Church House, Westminster, on March 21-23. The arrangements for the conference are the outcome of co-operation with the Department of Scientific and Industrial Research and the European Productivity Agency of the Organization for European Economic Co-operation.

Sir Harold Hartley, President of the Institution of Chemical Engineers, will preside at the opening and closing sessions. In all, some 33 papers will be presented, including one by Mr. G. U. Hopton, Senior Research Chemist of the North Thames Gas Board, on 'The Examination of the Institution of Chemical Engineers.' Members of the Institution wishing to attend the conference should register not later than January 31. Non-members may apply to attend, but in view of limited accommodation priority will be given to delegates nominated by O.E.E.C. member countries and members of the Institution.

Tenants of Council Houses at Rushden, Northants., who have gas pokers installed in their homes, have asked the Urban District Council to bear the cost of replacing worn out pokers, but this the Council has refused to do. All tenants must bear the full cost of replacement.

'Ascot' Annual Dance

An event that always attracts a large attendance is the annual dance of Ascot Gas Water Heaters, Ltd. The gathering last year was so great that the organizers arranged for this year's function to be held on two successive nights; this certainly allowed more room for the dancers to move about. As on previous occasions the dance was held at the Seymour Hall, London, and this year it took place on January 20 and 21. When we looked in it was clear that all were having a very good time, the Chairman of 'Ascots', the Earl of Limerick, not least among them. During both evenings a number of valuable spot prizes were given away, the draw being made by Mrs. S. L. Pleasance, wife of a Director of the Ascot company, and the presentations being made by Mr. Pleasance himself. On Friday evening the Chairman presented the prize for the best apprentice of the year to Clive Garry, aged 21; this is the fourth year running that Clive has won this prize.

Ninety out of every 100 Loughborough housewives cook with gas, said Mr. S. A. J. Horrod, manager of the Loughborough undertaking of the East Midland Gas Board, at a Rotary Club luncheon talk. The national average, he added, was 80 out of 100. 'It is our honest endeavour to build up a first-class service to give a full and wide consumer satisfaction,' he concluded.

Beaver Report

A meeting of the Institute of Fuel for the discussion of the Beaver Report, held at the Institution of Civil Engineers on January 20, drew an attendance of some 350 members of the public in addition to members of the Institute of Fuel, including specialists from all the fuel industries concerned.

The discussion was opened by Dr. G. E. Foxwell, a member of the Beaver Committee and a past President of the Institute of Fuel, and after a long and animated discussion it was announced that the meeting would be continued at the same place at 5.30 p.m. on February 2. We hope to publish a report of the discussion in a later issue of the 'JOURNAL.'

Increase in Coke Prices.—In consequence of increased costs of movement and distribution, the Minister of Fuel and Power authorized increases in the maximum retail price of gas coke with effect from January 31. The increases affected the areas of five of the 12 gas boards, and ranged from 1s. 8d. per ton in London to 5s. 2d. per ton in the Southern area. The Eastern Board has four zones in which prices have been raised by sums ranging from 1s. 8d. to 5s., and the South Eastern Board has three zones, with increases of 1s. 8d. in the inner zone and 2s. 11d. in two outer zones.

George Wilson Dinner

The Coventry Works Social Club of George Wilson Gas Meters, Ltd., held its annual dinner and dance on January 14, and it was very well attended. An enjoyable evening was spent by all, and the dancing included many novelty dances. Mr. W. D. Wilson, Chairman and Managing Director, in reply to the toast of the Social Club, spoke of some of the difficulties which had been encountered in the past two years and

Mr. W. D. Wilson making a few remarks after dinner.

which now appeared to be lessening. He referred to new products which were coming into production and expressed the view that these would be of benefit to everybody and especially the Social Club in bringing in more members.

Mr. F. C. Wilson and Mr. D. C. E. Poole, Directors, were also present. Mr. F. C. Wilson recalled the riotous and hilarious parties held in the early days of the firm's history, both prior to and immediately after the 1914-18 war. The evening concluded at midnight with Auld Lang Syne.

We understand that 'Guilty Chimneys,' the latest Gas Council film, is to be shown at the House of Commons next Tuesday.

Women's Gas Federation.—The first annual meeting of the four-months-old Scarborough branch of the Women's Gas Federation was attended by 115 members. Mrs. D. M. Haigh, presiding, said that in the first three months the membership totalled 155, and they now had a waiting list. Miss S. Harrison, Scarborough's home service adviser to the Board, and Secretary, gave a glowing report of the branch's progress, and Miss M. L. S. Yeoman, Treasurer, reported healthy finances. Mr. W. R. Grist showed two colour films, and it was announced that a weekly homecraft course is to be started on February 1 with 60 members.

JUVENILE LECTURE AT BRISTOL

In addition to the Christmas Lecture given by Dr. A. E. Haffner at the Royal College of Science early in January, and reported in the 'JOURNAL' of January 12 (p. 117), the Institution of Gas Engineers, in co-operation with the South Western Section, arranged two lectures to young people at Bristol. The demonstration-lecture on 'Flame' was given by Mr. Frank Brinsley, M.SC., on behalf of the Institution in the H. H. Wills Physical Laboratory, University of Bristol, Royal Fort.

Two lectures were given, one in the afternoon and one in the evening and in the case of the former, the City of Bristol Education Department co-operated in making available parties of school children. For this lecture, the attendance was 460—a figure understood to be in excess of any similar lecture previously given by Mr. Brinsley. In the evening, the lecture was advertised and the attendance was in excess of 250.

Our photograph shows Mr. Brinsley demonstrating a hydrogen flame burning in chlorine.

On both occasions the speaker was introduced by Mr. W. B. Claridge, Chairman of the South Western Section of the Institution of Gas Engineers, and the South Western Gas Board made all the arrangements concerning the lectures.

A Decade of Design

The Council of Industrial Design and its Scottish Committee celebrated their tenth birthday on January 12, the anniversary of the inaugural meeting held in 1945. The Council's original brief was 'to promote by all practicable means the improvement of design in the products of British industry.' This implies a threefold approach—to the manufacturer, the retailer, and the public.

Any firm or, indeed, anyone with a design problem, can consult the *Record of Designers* and be given a short list of designers with specialist skill in trades ranging from heavy engineering to fine handcrafts. This service now deals with more than 400 enquiries a year, and is valuable to small manufacturers with no permanent design staffs. The *Record of Designers* now contains the names of nearly 2,500 designers; and makes an important contribution to the raising of British design standards. To assist the manufacturer in marketing the finished product and to provide a quick reference to well-designed goods in current production, there is *Design Review*, the Council's photographic and sample index, for which over 6,000 items have now been accepted.

Altogether, 120 public exhibitions have been organized since 1945. These range from the large-scale—such as the 'Britain Can Make It' exhibition in 1946, or the selection of 10,000 industrial exhibits in the six Festival of Britain exhibitions in 1951—to small displays of domestic consumer goods. There have been 16 overseas exhibitions, including two important stands at the Canadian National Exhibitions of 1953 and 1954. More than 14 mill. people have so far attended exhibitions in Britain.

The next ten years may well see great advances in British design. During that period, the Council aims to prove beyond doubt that the President of the Board of Trade and the small group of visionaries who planned it have invested public money wisely to obtain a handsome return in the greater attractiveness and, therefore, saleability of British goods.

Gas Council Course on Management

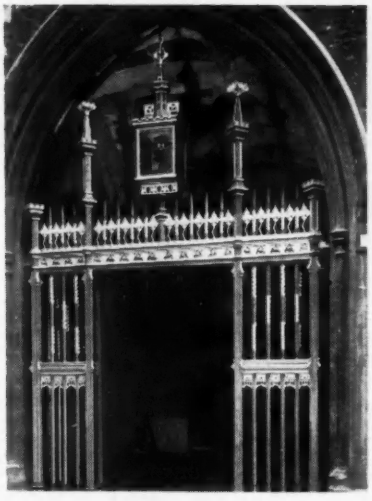
The second Gas Council Course in Management opened at Brooklands County Technical College, Weybridge, on January 10. It is the first of a series of three or four such courses to be held during 1955, at which selected personnel from the gas industry are given a greater insight into the many facets of management. The present course, although basically following the principles of the very successful course held last year, has taken on a rather broader outlook designed to take in the industry's latest requirements.

Special attention is being paid to the value of technological and professional activities in relation to the needs of industry, and the students will be given the opportunity for more active field enquiries with more visits to outside industries. Also, one full day in each course will be devoted to the subject of increased efficiency in the gas industry, a subject which, it is hoped, may well become a focal point for the course.

The students, 15 in number, selected from all spheres of the industry, are resident at the College during the six-weeks course. They not only attend lectures given by the college staff and by members of the industry, but are also expected to take full part in discussions and debates. The course is a highly concentrated one, and covers the fields of self-expression and committee procedure, management studies, and industrial relations. Under these headings the candidates are instructed in such items as how to speak and to be understood, the art of interviewing, leadership, delegation of duties, productivity, sales promotion and market research, and fundamentals of industrial relations.

Lectures are conducted on two systems, 'syndicate' and 'conference.' Under the syndicate system, a student acts as chairman during the lecture and the following questions. The students then split into groups, each appointing a chairman, to discuss a topic arising from the main lecture. Each syndicate reports its findings and an open discussion ensues. Contrasting with this is the 'conference' system where the main lecture is followed by a general 'round-table' discussion. In this way the students have practical experience in what is considered one of the most important aspects of the course, self-expression, and the art of stating a case before a critical audience.

STILL SHINING



Every year thousands of visitors to Westminster Abbey pass through this fine gateway next to the Chapter House in Deans Yard which leads into the Abbey cloisters. The ironwork, which was carried out by Gilbert Scott at the time of his reconstruction work in the Abbey in the 1860's, has recently been repainted in dull red and gold, and an integral part of the design is the old gas lamp surmounting the gateway, which still shines as brightly as it did 90 years ago.

Growing Demand for Instruments

New offices, showrooms, and warehouse of the Baird & Tatlock group of companies at 58, Lever Street, Manchester, 1 (T/N Central 0937/8) were opened on January 10. Mr. J. E. C. Bailey, C.B.E., Chairman and Managing Director, gave a short talk on the development of scientific instruments and chemicals and the increasing demand for them from the North of England. He stressed the dependence of scientific development on the scientific instrument industry and the link between the new discoveries in science and the progress of scientific instruments.

Mr. Bailey hoped that the new showrooms would provide scientists in the North of England with facilities previously only available in London and trusted that they would avail themselves of the new showrooms to inspect new and improved instruments and chemicals. Mr. A. E. Hobson, Manager of the new Northern Division of Baird & Tatlock (London), Ltd., invited visitors to inspect the showrooms and the instruments on display and told them of the facilities which would be provided by the new Division.

Summer School of Welding

The fifth Summer School of Welding organized by the British Welding Research Association will be held at Ashorne Hill, Leamington Spa, from June 27 to July 2. The school takes for its basic theme 'Welding Developments in British Industry,' and has been devised to cover various aspects in logical sequence during the course. As in previous years, lectures of general interest will be given in the mornings, and lectures of more specialized interest in the afternoons. To meet particular requirements, students will be divided into groups A (pressure vessels), B (transport), C (shipbuilding), and D (specialized welding techniques). It is possible that an additional group on inspection and testing will also be included.

There are two innovations this year —groups on transport and specialized welding techniques. In the former, lectures will be of interest to all in the railways and associated industries, including road transport. The group on specialized welding techniques satisfies a demand which has been steadily growing for a more detailed study of gas-shielded welding processes. It is also proposed to organize an exhibition at the school to illustrate the latest welding methods and recent developments in these processes.

The school is open to all and special arrangements have been made to increase the places available by booking additional accommodation in local hotels, as last year over 50 applications had to be refused owing to lack of accommodation. Application forms are obtainable from the Organizing Secretary, 29, Park Crescent, W.1.

As the champion hurdler's faultless performance and flawless appearance delight her critical spectators, so the faultless performance and flawless appearance of the Century Cooker delight the critical housewife . . . as the champion's perfect hurdling is the result of years of training and practice so the Century is the result of R. & A. Main's years of experiment and research.

Always to the forefront in improving the efficiency of the gas cooker, R. & A. Main Ltd. have been "first in the field" with many outstanding features . . . in 1922 Main introduced the simplified form of cooker construction . . . in 1927 Main were first with an all-enamelled cooker . . . and in 1935 Main introduced the first all-sheet metal cooker.

The No. 20 Cooker was the first chassis-less model to be produced and marketed in Britain, and it was also the first cooker to incorporate an oven-flue vent discharging in front of the backplate. The high efficiency and popularity of the Century has indeed proved the worth of Main's years of constant research.

MAIN No. 20 CENTURY GAS COOKER

C1

Note the name-made by MAIN

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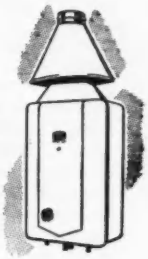
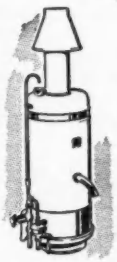


instantaneous for a complete household service . . . the M.I. Multipoint



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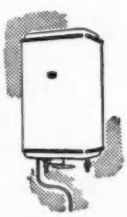
instantaneous or storage

for a complete household service . . . the G.L.C. Circulator

storage for a complete household service . . . the Thermain No. 15

storage for the sink or lavatory basin . . . the Thermain No. 2



MAIN WATER HEATERS Ltd.
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Interlinking Complete by End of 1957

Mr. C. H. Chester Addresses South Western Board for Industry

Mr. C. H. Chester, C.B.E., Chairman of the South Western Gas Board, addressed the South Western Regional Board for Industry in Bristol on January 4 on the working and operation of the Gas Board during its first five years. He said that when the Board came into being many of the smaller gasworks were not only out of date and, therefore, inefficient by modern standards, but their physical condition, like the quality and pressure of the gas they supplied, was poor, and little or nothing had been provided in the way of reserves for rehabilitation. The majority of the smaller and medium sized works were incapable of meeting the expanding demands and exceptionally cold weather or unforeseen emergencies.

For the first year of its operation, continued Mr. Chester, the Board had, of necessity, to continue, virtually unchanged, the methods of operation and charges it inherited while plans were made for the future. Broadly, the financial position at vesting date was that (a) the area as a whole was operating at a loss of 1d. per therm (£450,000 per annum), which was increased to 1.35d. for the 11 months by the £150,000 increased costs, and (b) this loss was due to the average price of gas, 14.52d. per therm, being at least a 1d. a therm below the cost of supply.

Large New Works Planned

The Board, very early in its work, decided to avoid heavy expenditure on small works and to concentrate all the development and technical skill at its command on the planning of large new works which, together with certain existing modern plants, would be able to supply the gas required for the whole area in the space of ten years. Integration therefore was essential to use these plants to maximum efficiency—many of them being operated on the base load principle. At the present time the works at Swindon, Bath, and Bristol are interconnected. The Swindon and Bath coal gas plants operate continuously and take the base load, while the Bristol plants make up the additional requirements. By 1965 only 16 large works will remain on production; the remainder will, by that date, have been closed down. It is impossible to distinguish the savings derived from the operation of the new plants from those derived from the improved technical control of all existing plants, but the overall total of these improved operational efficiencies throughout the area is now running at the rate of 2.34 therms of gas and 0.67 cwt. of coke and breeze for every ton of coal carbonized, which is equivalent to 49,500 tons of coal and 50,000 tons of coke and breeze, or a saving of £310,000 per annum.

The two major problems affecting the Board's relations with its consumers at vesting date concerned the diversity of practice and the standard of quality. Interpreting its duties under the Gas Act to mean that, so far as possible, all its consumers should be treated equally, the Board's plans were based on improving the quality of its commodities and supplying them on terms comparable as between one consumer and another. The standard of gas supply to consumers varied not only because of the size of the undertaking, but also as a result of the low standard of maintenance of plant and mains during the war. The low standard of maintenance of mains and of consumer service can be illustrated when one takes the average cost of distribution and consumer service which only increased by 50% between 1938 and 1949-50, whereas the cost of general works and plant maintenance increased by 126%. The fact that most of the smaller undertakings did not supply gas of a standard calorific value meant a loss of efficiency in consumers' appliances. Gas pressure was low or unsuitable in many places.

Gas of Standard Quality

It has taken time to locate the various faults and put them right, particularly when materials and skilled labour were short and prices high. By the end of the first five years all the most urgent work had been done, 664 miles of new mains had been laid and a further 44 miles of old main replaced; over 40,000 additional consumers had been connected and nearly 34,000 services completely renewed; many thousands of yards of blocked mains had been cleared and more particularly all gas sold was of a declared calorific value, of standard quality and satisfactory pressure.

The numerous types and wide variety of charges for gas and appliances on hire at vesting date made it urgent that the Board should introduce some measure of uniformity and comparability into its prices as soon as possible. The need for standard tariffs, based on sound principles, became more and more clear as the costs of manufacture and supply of gas increased and it became necessary to pass on to the consumer only part of the higher costs. The Board further considered that as the carbonization of coal was the most efficient method of using the nation's main source of heat and power, it was right that its system of charges should encourage the use of gas by domestic consumers and industrial consumers.

The general form of the tariffs was completed by June, 1951, since when minor improvements of detail and certain extensions have been introduced. The first test of any system of pricing is in its results, and the fact that the Board's tariffs have promoted the increased sales of gas to all classes of consumers in times of rising prices and against severe competition, would point to their complete success. Through improved efficiency and organization it will have been possible, by the end of next quarter, to avoid any increase for three years.

Under the domestic tariff there are five price areas, ranging from the densely populated districts in the north of the area nearest to the coalfields to the scattered rural districts in the south of the area. In addition the Board operates a non-domestic optional two-part tariff available for certain specific premises, hotels, catering establishments, schools and bakeries. In September, 1952, the Board decided to introduce a constant demand tariff to cater for the large industrial user. It is made available to consumers of not less than 1,000 therms per quarter for a guaranteed quantity for a period of not less than three years.

Appliance Sales

Domestic appliance sales for the five years ended March 31, 1954, included:

Cookers	194,956
Water heaters	49,727
Fires and space heaters ...	43,823
Wash boilers and washing machines	73,092
Refrigerators	2,222
Gas coke grates	20,573
Other appliances ...	58,287
Total number sold ...	442,680
Total sale price (excluding maintenance charges and interest on hire purchase contracts)	£7,748,686

Sales of all appliances for the six months ended September 30, 1954, were at a much higher level, and the Board was enjoying phenomenal increases of over 250% in the sale of water heaters. The South Western was the first gas board to introduce simple hire terms for water heaters; many of the other boards quickly followed its example.

The importance of coke in the economy of the Board is appreciated from the fact that the Board's total revenue from all sources is over £16½m. and coke and breeze contribute nearly £4m., or some 25%. Since vesting date the Board has been urgently engaged in improving the methods of manufacture with the object of making the maximum amount of coke for sale, and also in improving the quality of the coke it offers to consumers, which depends to a considerable extent on the quality of coal supplied to the Board. This is done in two ways (1) by selling only the best coke and using the inferior in the manufacture of water gas and for other internal purposes, and (2) by grading coke so that the most suitable size is available for the various types of appliances. In the first year of the Board's working, 1949-50, it sold 542,006 tons of coke and 48,763 tons of

breeze. In the year 1953-54 it sold 635,150 tons of coke and 76,056 tons of breeze; an increase in the four years of 93,144 tons of coke and 27,293 tons of breeze.

In addition to coke the Board produces large quantities of tar for road repairs and many chemical uses, which contributes some £500,000 annually to the Board's revenue. The quantity of tar produced has increased by 11% over the five years; in the year ended March 31, 1954, the amount was 18,970,057 gal. Carbon black is also produced at the Cheltenham and Gloucester manufacturing stations, and provision is being made by the Board to install a further plant at Gloucester. The process uses a large quantity of heavy oil to make a gas which can be mixed efficiently with coal gas produced in other sections of the works. There is also a large saving in the amount of coal used. The carbon produced by these plants is chiefly used in the manufacture of motor car tyres.

Gas oil is also used in the manufacture of water gas. I have recently spent four weeks in the United States and Canada where I saw processes to use heavy residual oil from refineries for the manufacture of gas. We, in this country, have the new oil refineries in operation and therefore there will be quantities of residual oil available which can be gasified in two types of plant.

A further potential development is the profitable use of immense quantities of natural gas now going to waste in many parts of the world, particularly in the Middle East, and technical and commercial investigations are being made into the possibility of importing this gas into this country. This, if successful, would revolutionize the gas industry, as it has done in the United States, and is now commencing to do in Canada; alongside these new developments is a further process for the use of heavy residual oil to produce high quality gas. During my visit to the United States and Canada it was remarkable to find that 97% of the huge and rapidly expanding gas industry in the United States is now supplied from natural gas resources and heavy oil residuals, and the development in Canada from the huge oil fields in Edmonton and British Columbia will contribute to the great industrial development of that country. The South Western Gas Board has ordered a plant of the type inspected, which makes high calorific value gas from heavy residual oil in a process developed in the United States. The Board will consider, with the knowledge that it now has, the possibility of distributing higher calorific value gas because of the material economic advantages and capital savings which will result from the processing and distribution of higher quality gas.

The interlinking of gasworks in the area will be more or less completed by the end of 1957, and this will facilitate the employment of new processes and the complete employment of efficient gas making apparatus. It was with this knowledge of the immense future developments of the gas industry that the Board again this year—for the third year running—decided that in spite of large increases in the cost of coal, transport, wages and other materials, amounting to £1,400,000 since the last adjustment in prices was made, not to increase the price of gas but to rely on further increased efficiency, new processes and increased sales.

British Industrial Measuring & Control Apparatus Manufacturers

An industrial revolution greater than the world has yet seen was predicted by Sir Roger Duncalfe, President of the British Standards Institution, at the annual luncheon on January 18 at Londonderry House, London, of the British Industrial Measuring and Control Apparatus Manufacturers' Association (BIMCAM).

Earlier, Sir Edward Boyle, M.P., Parliamentary Secretary to the Ministry of Supply, had stressed the great importance of BIMCAM's work for the small firm as well as the large, and referred to the shortage of control engineers which his Ministry, with the Ministry of Education, was trying to put right. The Ministry took a great interest in the work of the Association. They were large users of instruments and the sponsoring department of the instrument industry. He understood that the ordnance factories were planning increases in the use of instruments.

Sir Roger Duncalfe, who is also Vice-President of the Federation of British Industries, paid a tribute to the BIMCAM *Handbook*, out of every page of which he had 'got a thrill'—the advertisements as much as or more than any other if I were to change my industry, I should choose yours. And why? Because in this science of measurement, which is as old as history, we are moving at an ever-increasing pace. The stage now under development is moving forward from the automatic control of the individual operation to the automatic linking of a series of these controlled operations to a master electronic device controlling the movement of material from one process to the next with an accuracy of prediction and a delicacy of adjustment exceeding anything human control or judgment could achieve. The social and economic implication of the completely automatic factory and of public services such as transport, power production, public heating and lighting—and it may be, defence—under electronic control cannot yet be foreseen.'

Sir Roger mentioned the possibility of doubling our living standards within the next 25 years. This could only be achieved by an immense increase in productivity. 'If we are to have greater plenty—more of those things we all want—we must, with an ageing population living on pensions and a working population desiring shorter hours of work, be ever searching for ways and means of reducing the man-power content of our goods—we literally cannot afford to use man-power where an instrument can do the job as well or better. Here we need the full measure of your genius because the controlling instrument is, I believe, the most powerful factor of all.'

Sir Roger's last word, as Deputy Chairman of the Beaver Committee on Air Pollution, was 'as one of your first jobs, help to cure smog.'

In 1940 in response to a request by the Board of Trade the instrument industry formed the Meters and Measuring Export Group to encourage exports and allocate raw materials. In 1944 the habit of co-operation which firms had learnt in the Export Group led them to decide to form a trade association to deal with a wider variety of problems. BIMCAM and the words for which the initials stand was thought to be a convenient way of describing the industry which manufactures apparatus for indicating, recording and controlling flow, pressure, temperature, level, gas analysis, specific gravity, humidity, conductivity and so on, together with many specialised applications.

Membership has continued to grow and BIMCAM now consists of 32 firms which it is estimated represent more than 90% of the productive capacity of the industrial instrument industry in this country. The Association is the recognized point of contact between the industry on the one hand and Government departments and users on the other. In particular, the Association has close relations with the Ministry of Supply.

The main objects of the Association are: (1) To provide a central body to survey and foster the interests of the British industrial instrument industry; (2) to develop close collaboration between its members and the industries they serve and to encourage the interchange of information in the general interest; (3) to encourage research and the development of improved techniques and to promote higher efficiency within the industry; and (4) to maintain the highest standards of performance, installation and servicing of British industrial instruments in the mutual interest of users and manufacturers.

The activities of the Association vary according to the problems of the day. The activities undertaken during 1954 included publicity, assembling evidence for the Beaver Committee, co-operating with the National Industrial Fuel Efficiency Service, discussing the value of exhibitions at home and abroad, assembling information for Board of Trade negotiators at trade talks, and organizing, in conjunction with related associations, the British Instrument Industries Exhibition which is to take place at Earls Court from June 28 to July 9.

TRADE NEWS

Dust collection by water washing

The new 'Airflo' patent wet settler is claimed by the makers to be easy to maintain due to its system of discharging the dust to an outside settling tank without the aid of a pump or ancillary equipment.

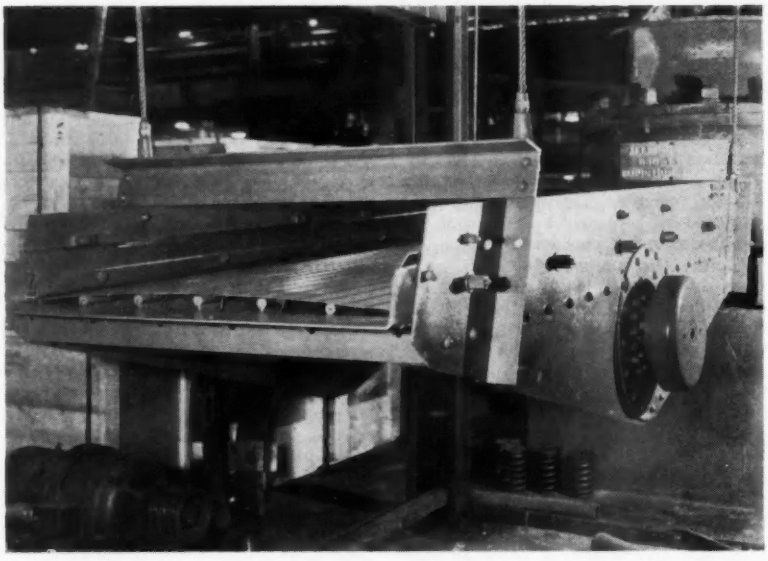
Dust, in its various forms, behaves in different ways, some settling in the form of a mat on the top of the tank and some precipitating to the bottom. Again, sometimes a combination of the two is reached. This settlement, in either or both forms, can be easily controlled by a system of weirs within the outside tank, but these considerations do not affect the design of the main settler in which the actual air washing is performed.

In the 'Airflo' settler the dust is discharged into the main chamber of the unit in which a fine water mist may be introduced in special cases. In the standard pattern the dust travels down to the water level, this water flowing with a wave motion towards a high velocity slot at one side of the collector, the waving motion being created by an angular plate. The dust entrained in the water is carried through the high velocity slot to a spray chamber in which the air movement lifts the water to a main baffle immediately above, this baffle serving the purpose of returning the mist to a flow trough at the rear of the unit in small types. This principle is doubled in the case of the larger units and a flow trough is arranged at each side.

The water discharged into this trough or troughs is flowed out of the unit through patent air pressure release valves into the main settling tank from which the water recirculates back to the main flow plate to again receive its dust loading.

The only other consideration to be brought out is that the unit may be worked under suction or pressure but in all respects suction is preferable as the fan then handles clean air. As a comparison with other types of collectors the pressure drop through the wet settler stays constant at 3 in. w.g., whereas in a bag filter, to give a similar efficiency, the pressure may vary from ½ in. w.g. clean to 5s. in. to 6 in. w.g. dirty, say the makers.

The unit in its standard form will collect all dust particles to eight microns approximately with a medium load, but with the initial mist in the main chamber this figure can be considerably reduced.—*The Industrial Fan & Heater Co., Ltd., Sparkhill, Birmingham, 11.*



A 'Ripl-Flo' screen of the type which may be installed in a Midlands gasworks. In actual installation it would be installed between 18° and 27° to the horizontal.

Possible vibrating screens development

Allis-Chalmers Great Britain Ltd. began to market and distribute their 'Ripl-Flo' vibrating screens in this country about two years ago. In the United States their principals had been doing this for some considerable time. Now, say the firm, they are negotiating in the hope of being able to install a screen in a gasworks in the Midlands—the first in any gasworks in this country.

Our illustration is of the type of 'Ripl-Flo' screen in question. This is suspended by four cables located one at each corner from soft steel coil springs mounted on spring seats bolted to overhead steelwork. The coil springs shown directly underneath the screen isolate up to 97½% of the vibration which would normally be imparted to the supporting structure, say the makers. We should point out that this picture shows the screen slung in a horizontal position in the shops purely for convenience sake, whereas in actual installation this screen would be installed anywhere between 18° and 27° to the horizontal.

The screen is actuated by an out-of-balance shaft supported in two bearings only with eccentric weighted fly-wheels on the outer ends, producing a circular motion throughout the screen body, and Allis-Chalmers claim that the question of malignment of bearings is eliminated, as compared with the four-bearings type of machine which has two outboard bearings for static mounting and two inner bearings carrying the actuating mechanism.

The screening surface is cambered to effect a prolonged life of screen cloth, being side-tensioned by hookstrips, the longitudinal support bars being covered by rubber channelling in the case of coal. But in the case of coke these would be substituted by replaceable steel channelling, due to abrasiveness of coke.

The particular duty for this screen, if installed in the gasworks concerned, would be to screen coke breeze at $\frac{3}{16}$ in. aperture with 16% surface moisture, for which would be incorporated the firm's patented 'Sta-Kleen' feature. This comprises numerous pockets formed in the specially deepened support frame, in which are retained rubber balls below the screening cloth to impart secondary vibration to the screening cloth to assist the dislocation of adhering fines, the build-up of which usually results in blinding of the cloth.

Another Allis-Chalmers production is the 'Low-Head' screen which is designed for installing where there is limited headroom. This screen is suspended on the same principle as the 'Ripl-Flo'—from soft steel springs—but the motion imparted to the body of the screen by the mechanism, is at 45° to the screening surface and produced by out-of-balance weights on a driver and driven shaft within the box.

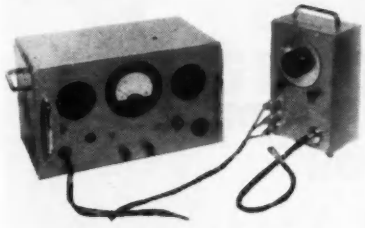
In both 'Low-Head' and 'Ripl-Flo screens the makers claim low maintenance and replacement costs, due to the simplicity of design and ruggedness of structure. This is despite the high speed at which the screens run—normally in the region of 900 r.p.m.—*Allis-Chalmers Great Britain Ltd., 728, Salisbury House, London Wall, London, E.C.2.*

'Proximity Meter PM.4'

The 'Proximity Meter PM.4' is a development on type PM.2 manufactured by Fielden Electronics, Ltd., and consists of the same basic circuit as originally employed, but the R.F. bridge unit has been removed from the main case and put into a subsidiary case away from any temperature rise.

Claimed to have innumerable uses and to be used by laboratory and research

workers all over the world, the Fielden 'Proximity Meter' is now described in a 28-page booklet of interest to those concerned with problems of measurement. Among such problems might be those in the fields of micro displacement, strain, concentricity, surface irregularity, vibration, torque, thickness, weight pressure, moisture, dielectric difference as applied to gas, solids or liquids.



'Proximity Meter PM.4.'

An important factor is that, in most cases, it is unnecessary for there to be any physical contact with the specimen under observation.

The new modification gives greater stability of the R.F. measuring circuits, and has shown itself particularly useful for research work calling for longer term stability than that for which the original model was suitable. The reference for this publication is No. 225FE/103.—*Fielden Electronics, Ltd., Paston Road, Wythenshawe, Manchester.*

Finger-tip wall charts

The new 'Unigraph' coloured wall chart has been designed with colours built-in so that by the touch of a finger, bars or lines can be projected, either in single colours or in a variety of colours, thus providing graphic records of such variables as temperatures, pressures and flows.

The chart consists of rows of plastic discs each divided into five coloured segments, including white. These discs can be rotated between engraved white plastic scales to form lines or single points of colour. The general effect is, therefore, of brilliant coloured lines on a white background. Each disc is capable of giving a choice of ten colour codes.

The scales between the discs are numbered and have a small hole by each number, into which a coloured plug can be set for coding additional information if required. At one side of the chart index slips can be inserted at the end of the lines of discs to show the subject to which they refer.

'Unigraph' charts are made in three models with 25 lines of 72 discs, 50 lines of 24 discs arranged in two columns, and 75 lines of 24 discs arranged in three columns. If required, solid or transparent security covers can be fitted.

The outer dimensions of the chart frame are constant, but within limits, the arrangement of the discs and indices can be accommodated to suit requirements. These outer dimensions are 37 in. wide × 26 in. high, and the frame is of aluminium, enamelled grey.—*Office & Factory Equipment (Leeds), Ltd., Templar Chambers, 10, Merrion Street, Leeds.*

Gas distribution network calculator

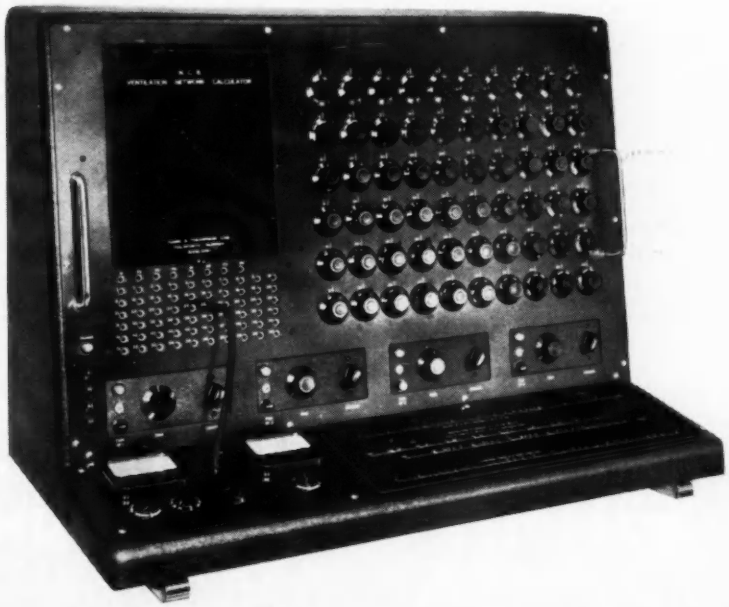
An instrument developed by Nash & Thompson, Ltd., for the solution of ventilation problems in the coal mining industry, is under active consideration by the distribution engineers of a number of area gas boards for the solution of somewhat similar problems in the design of gas distribution networks. A tentative specification for a suitable instrument has been drawn up during consultations between the calculator engineers of Nash & Thompson, Ltd., and the distribution engineers of these boards.

It is quite possible that the specification could be altered in the light of comments made by other area gas boards and the firm concerned has indicated that it will be pleased to consider suggestions from other engineers interested in distribution problems.

This method of solution of problems of distribution is based upon the establishment of a network of linear electrical resistors identical in pattern to the system to be studied. This enables Kirchhoffs relationships to be continuously satisfied while the electrical resistances of the instrument are adjusted until the electrical currents flowing through the network correspond with the flows in the system. The flows, pressures and pressure drops around the network are read on calibrated meters connected to the circuit by means of jacks. The resistors in the instrument, which simulate branches of the system, are brought out to a connection panel where they may be connected into a number of junctions. Power packs stabilized against mains supply changes are provided to simulate sources of pressure, e.g., holders or governors.

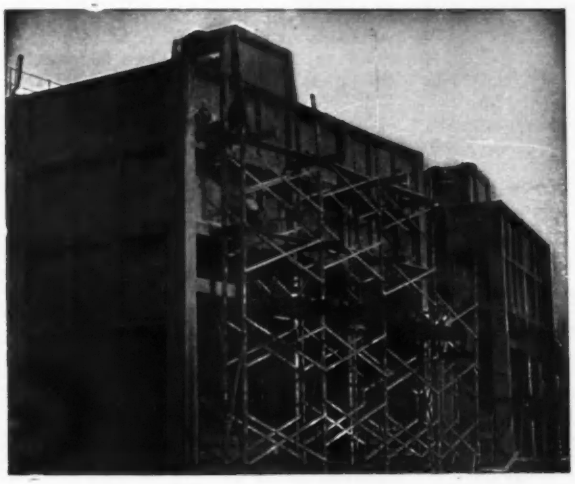
Maximum gas flow in any branch of the network is 600,000 cu.ft. per hour and the minimum that can be indicated by the meters used is 250 cu.ft. per hour. The maximum pressure drop that can exist is 10 in. w.g. and the minimum that can be read on the meters is 0.001 in. w.g. The instrument incorporates 60 resistors to simulate branches in the system and 40 offtake or demand units which will take a constant load from the system over variations of pressure from 10 in. w.g. down to 2.5 in. w.g. These simulate the constant demands which exist in a distribution network and which are unaffected by changes in circuit pressure. Twenty of these will cover flows between 10,000 and 50,000 cu.ft. per hour and the remainder flow between 2,000 and 10,000 cu.ft. per hour. The possibility of adding a few loads rated up to 100,000 cu.ft. per hour is being considered, but in any case the existing units can be connected in parallel if necessary. Four source units, each capable of supplying the equivalent of 500,000 cu.ft. per hour at pressures up to 10 in. w.g. are fitted and these can be connected in parallel if required.

The above network elements can be connected to 48 junction points, each accommodating up to four lines. The complete instrument will consist of two of the units shown in the accompanying illustration, each of these being 43 in. wide by 33 in. high by 23 in. deep and weighing approximately 180 lb.—*Nash & Thompson, Ltd., Oakcroft Road, Tolworth, Surrey.*



The ventilation network calculator, a modification of which is proposed for the solution of gas distribution problems.

Gunite



One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking.

Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have exceptional value.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained whenever Gunite is applied.

For lining coal bunkers and steel chimneys it possesses great resistance to corrosion and protects steel-work from the abrasive action of coal or coke.

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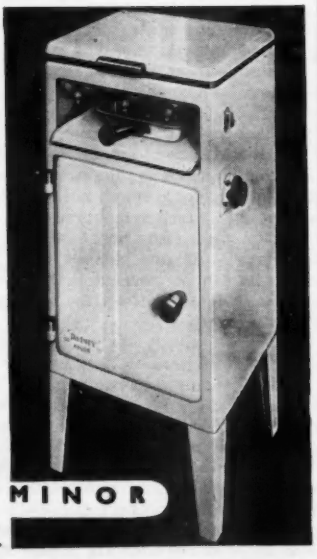
Approved and adopted by leading gas boards

The **Dainty** MINOR



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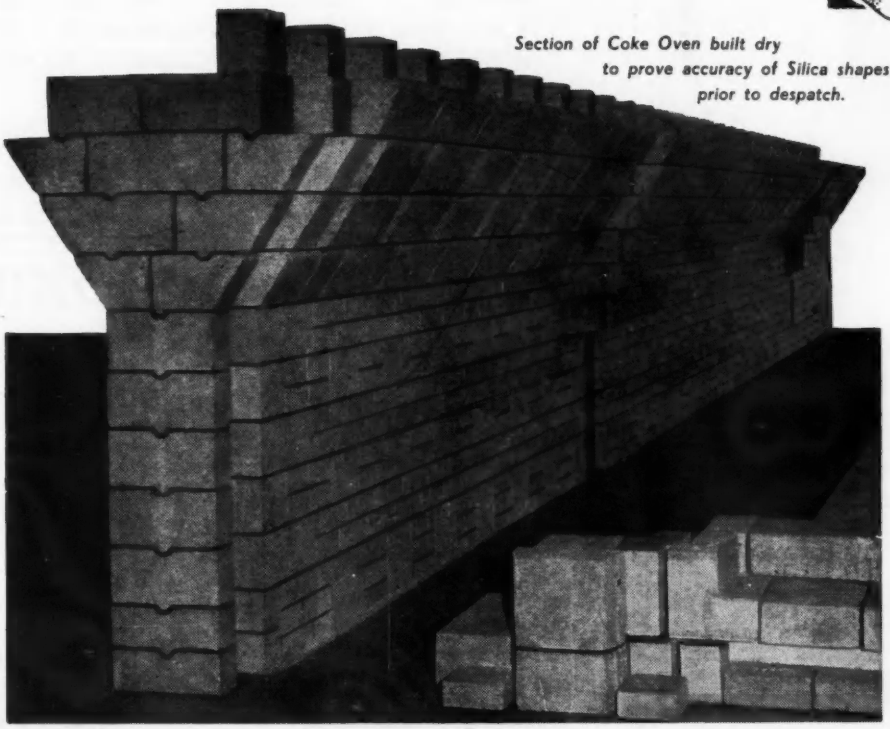

Section of Coke Oven built dry to prove accuracy of Silica shapes prior to despatch.

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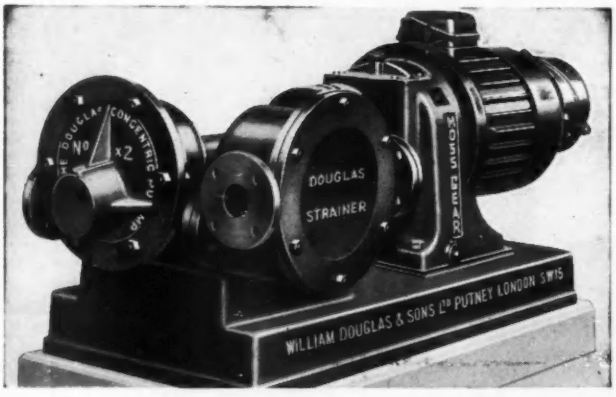

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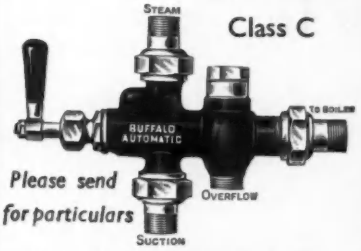

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'Phone: Northern 0989. 'Grams: Reckoners B'ham.

PUBLISHERS' NOTICE

The " Gas Journal " is published every Wednesday, price 1/3d.; by post 1/5d.

Subscription Rates: Home and Empire:—52/- per annum; Foreign:—60/- per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words)—minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10 in. deep × 7 in. wide; block screen 120.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS MANAGER: G. B. Torrance, 42, Wychall Lane, King's Norton, Birmingham, 30. *Telephone:* Kings Norton 3868

NORTHERN MANAGER: Philip W. B. King, Flat 1, 7 Langcliffe Avenue, Harrogate. *Telephone:* Harrogate 67625.

SOUTHERN REPRESENTATIVE: A. Engelhardt, 11, Bolt Court, Fleet Street, E.C.4. *Telephone:* Central 2236-7

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APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

GRADUATE IN CHEMICAL OR FUEL ENGINEERING, age 30-35 with practical experience preferably of industrial gasification plants.

Applicants should have the outlook and ability to undertake an increasing measure of responsibility in the development and construction of coal gasification plants, after gaining specialised experience on existing and new plants in U.K. during the first year or two of employment.

A working knowledge of German is desirable. Good starting salary and excellent prospects. Headquarters near Birmingham. Full particulars to No. 226, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

DRAUGHTSMEN required, preferably with experience in Steel Structures, Pipework, Foundations or Refractories. Write, stating full particulars and salary required to: The Chief Draughtsman, Furnace Department, The Wellman Smith Owen Engineering Corporation, Ltd., Parnell House, Wilton Road, London, S.W.1.

APPLICATIONS for the appointment of WORKS MANAGER are invited from executives who have had a good apprenticeship training in light engineering with subsequent technical and supervisory experience in the manufacture of Gas Meters and Gas Water Heaters by latest production methods. The Company is also interested in medium-sized presswork and steel fabrications. Candidates should be cost conscious and with experience of budgetary control.

All applications, giving full details of positions held and salaries earned to date, should be forwarded to No. 224, *Gas Journal*, 11, Bolt Court, Fleet Street, E.C.4.

A LARGE Constructional Engineering Company in Midlands requires in its Drawing Office an experienced SECTION LEADER age 35/55 who would also act as deputy to the Gas Engineer. Applicants who should have had experience in Gasholder and general platework design will find this post of executive status a fine opportunity with good salary and pension scheme. Applications in strict confidence with full particulars of present employment and experience should be addressed to Managing Director, No. 222, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

ENGINEER/AGENT required (permanent) for supervision of gas and water mainlaying contracts in the Home Counties. Apply stating age, salary and full experience to R. E. Docwra Ltd., Public Works Contractors, Llanover Road, Wembley, Middlesex.

MORLEY PRODUCTS (PADIHAM) LTD.,

INVITE applications from suitably qualified persons for the following appointments.

SALES REPRESENTATIVE

For West Midlands and North Western areas. The successful applicant will be required to live on the territory. A car will be provided.

DOMESTIC LAUNDRY ADVISER

To tour the United Kingdom co-operating with Gas Board Sales and Home Service personnel to promote sales of Domestic Laundry Appliances and give local demonstrations to the public.

Applications for the above posts should give details of training, experience, age and commencing salary required. All expenses will be paid and a contributory pension scheme is available. Letters should be endorsed 'Sales Representative' or 'Domestic Laundry Adviser' as applicable and addressed to The Sales Director, Morley Products (Padiham) Ltd., 6-7 Russell Gardens, London, W.14.

EAST MIDLANDS GAS BOARD

LINCOLNSHIRE DIVISION
DRAUGHTSMEN—
DIVISIONAL HEADQUARTERS

VACANCIES EXIST at Lincoln for DRAUGHTS-MEN with experience of plant and pipework layout. Candidates holding a Higher National Certificate in Mechanical Engineering or similar qualification will be preferred. Applicants should be able to work on their own initiative with the minimum of supervision, and preference will be given to those who have had site experience.

The appointment will be made within Grades A.P.T. 5/7 of the National Salary Scales for Gas Staffs (£500-£665), the initial placing depending upon age and experience. The position is pensionable and the successful candidate will be required to pass a medical examination.

Applications stating age, qualifications, full details of experience, and giving the names of two referees should be addressed to the undersigned to arrive not later than February 9, 1955.

BERNARD CLARKE,
Divisional General Manager.

Belle Vue House,
Carline Road,
Lincoln.
January 19, 1955.

SOUTHERN GAS BOARD

CENTRAL DIVISION
READING AND DISTRICT
GAS UNDERTAKING
TECHNICAL ASSISTANT

APPLICATIONS are invited for the post of TECHNICAL ASSISTANT at the Reading Works at a salary within Grade 6 (Provincial 'A') of the National Salary Scales, £530-£610 per annum.

Candidates should have had experience of gas production on a medium or large works and preference will be given to those possessing a technical qualification.

The post is pensionable and the successful applicant will be required to pass a medical examination.

Applications, stating age and experience and giving details of training and the names of two referees, should reach the undersigned not later than February 8, 1955.

ATHOL W. BROWN,
Group Manager.

P.O. Box No. 34,
King's Road,
Reading.
January 21, 1955.

SOUTHERN GAS BOARD

EASTERN DIVISION
PORTSMOUTH, GOSPORT AND BOGNOR REGIS
GAS UNDERTAKING
HOME SERVICE ADVISER

APPLICATIONS are invited for the position of HOME SERVICE ADVISER from ladies holding a recognised qualification in Domestic Science and who are fully conversant with the organisation of cookery and other demonstrations.

The salary will be within Grade A.P.T. 3, Provincial 'A', £268-£404, according to experience and qualifications.

The successful candidate will be required to pass a Medical Examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required to join the Board's Staff Pension Scheme.

Applications, stating age and giving full particulars, should be submitted to the undersigned not later than January 31, 1955.

H. M. LAWRENCE,
Engineer and General Manager.

SOUTHERN GAS BOARD

NORTHERN GROUP, CENTRAL DIVISION
SALES MANAGER

APPLICATIONS are invited for the appointment of SALES MANAGER, to the Northern Group of the Central Division, with Group Offices at Reading, at a commencing salary in the region of £1,000 per annum.

Applicants must have had extensive and successful experience in promoting the sales of gas, coke and appliances and must be capable of controlling the sales staff and directing publicity.

The successful candidate will be required to pass a medical examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme.

Applications stating age, education, qualifications, training, experience, present appointment and salary, together with a one-page summary of these particulars, should be sent in an envelope marked 'Sales Manager' to the Secretary, Southern Gas Board, 164, Above Bar, Southampton, to reach him not later than February 4, 1955.

SOUTHERN GAS BOARD

SOUTHERN GROUP, CENTRAL DIVISION
SALES MANAGER

APPLICATIONS are invited for the appointment of SALES MANAGER to the Southern Group of the Central Division, with Group Offices at Aldershot, at a commencing salary in the region of £1,000 per annum.

Applicants must have had extensive and successful experience in promoting the sales of gas, coke and appliances and must be capable of controlling the sales staff and directing publicity.

The successful candidate will be required to pass a medical examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme.

Applications stating age, education, qualifications, training, experience, present appointment and salary, together with a one-page summary of these particulars, should be sent in an envelope marked 'Sales Manager' to the Secretary, Southern Gas Board, 164, Above Bar, Southampton, to reach him not later than February 4, 1955.

(*Classified advertisements continued on page* 266)

APPOINTMENTS VACANT (ctd.)

GENERAL MANAGER required for old established Gas Meter Company located in the Midlands. Sound commercial and sales experience in the Gas Industry, coupled with early training on the shop floor, will be considered important qualifications.

The Company is extending its interests in the light engineering field and every encouragement and support will be given to a man with initiative, willing to pursue a progressive policy. Apply with full particulars of career to date, stating salary required to No. 225, *Gas Journal*, 11, Bolt Court, Fleet Street, E.C.4.

WALES GAS BOARD

ACCOUNTANT—
LLANELLY, GOWERTON AND KIDWELLY UNDERTAKINGS

APPLICATIONS are invited for the post of ACCOUNTANT to the Llanelly, Gowerton and Kidwelly Undertakings. The successful candidate will be required to reside in the Llanelly area.

Candidates should be fully experienced in gas accounting, including all subsidiary records and final accounts; office organisation and control of staff.

The salary will be in accordance with Grade A.P.T. 9, Provincial 'A' (£655-£755 per annum). The post is pensionable.

The successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience together with the names of two referees, should reach the undersigned within fourteen days of the publication of this advertisement.

D. W. REES,
Engineer and Manager.

Gas Offices,
Murray Street,
Llanelly.

WALES GAS BOARD

RHYMNEY AND ABER UNDERTAKING

FIRST CLASS GAS FITTER required urgently. Full J.I.C. rates (Provincial 'A') and conditions of service.

A house will be available on a service tenancy and the rental will be reasonable. The successful candidate will be required to pass a Medical Examination.

Applications, giving details of age, present duties and references, should be made to the undersigned within ten days of the appearance of this advertisement.

D. I. ROWLANDS,
General Manager.

Wales Gas Board,
Rhymney and Aber Undertaking,
St. Martin's Road,
Caerphilly, Glam.

WEST MIDLANDS GAS BOARD

WARWICKSHIRE DIVISION
ASSISTANT CHEMIST—
COVENTRY DISTRICT

APPLICATIONS are invited for the above position at the Foleshill Works, Coventry. Candidates should be familiar with gas works processes.

The salary will be within Grade 5 (£500-£580 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, experience and the names of two referees, should be addressed to Mr. A. Allen, Divisional General Manager, West Midlands Gas Board, Warwickshire Division, Gas Street, Coventry, to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WARWICKSHIRE DIVISION
TECHNICAL ASSISTANT—
COVENTRY DISTRICT

APPLICATIONS are invited for the above position at the Foleshill Works, Coventry. Candidates should have had a good general training in all branches of gas manufacture.

The salary will be within Grade 5 (£500-£580 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, giving details of age and experience, together with the names of two referees, should be addressed to Mr. A. Allen, Divisional General Manager, West Midlands Gas Board, Warwickshire Division, Gas Street, Coventry, to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

BIRMINGHAM AND DISTRICT
DIVISION
ASSISTANT CHEMIST

CANDIDATES, who will be required for duty at one of the Works in the Birmingham Division, must have had some years' experience of the chemical control of a large Undertaking, and should possess a Higher National Certificate in Chemistry or have reached an equivalent standard.

The salary will be within Grade 7 (£585-£665 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, personal details, qualifications and particulars of training and experience, together with the names of two referees, should be addressed to Mr. J. E. Wakeford, Divisional General Manager, West Midlands Gas Board, Birmingham and District Division, Gas Offices, Edmund Street, Birmingham, 3, to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WOLVERHAMPTON AND DISTRICT
DIVISION
ASSISTANT DISTRIBUTION
SUPERINTENDENT—
WOLVERHAMPTON DISTRICT

CANDIDATES should have a sound knowledge of high and low pressure gas supply, and of main and service laying by direct and contractors' labour. There are over 300 miles of mains in the District.

The possession of the Institution of Gas Engineers' Higher Grade Certificate in Gas Supply, or the City and Guilds of London Institute Technology Certificate (Supply) will be an advantage.

The salary will be within Grade 8 (£625-£705 per annum) of the National Salary Scales for Gas Staffs, and a house or flat may be available.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. Stanley Jones, Divisional General Manager, West Midlands Gas Board, Wolverhampton and District Division, Kensington House, Bath Street, Dudley, to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

SCOTTISH GAS BOARD

FIFE GROUP
COWDENBEATH DISTRICT
TECHNICAL ASSISTANT

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT to the above District.

The Salary will be Provincial 'B', A.P.T. 6 - 4 (£515-£595 per annum).

Candidates should have experience of Horizontal Retorts, Tully and/or Water Gas Plants and Distribution practice.

A five-apartment house is available at a moderate rent.

The position is pensionable and the successful applicant may be required to pass a medical examination.

Applications endorsed "Technical Assistant" giving full particulars of age, qualifications and experience together with *copies* of three recent Testimonials, or the names and addresses of three Referees to whom reference can be made, to be lodged with the undersigned not later than February 14, 1955.

W. T. GILCHRIST,
District Manager.

Elgin Road,
Cowdenbeath.
January 22, 1955.

SCOTTISH GAS BOARD

KILMARNOCK GROUP
KIRKCUDBRIGHT DISTRICT
APPOINTMENT OF
DISTRICT MANAGER

APPLICATIONS are invited from suitably qualified persons for the post of DISTRICT MANAGER of the Kirkcudbright District Gas Undertaking.

Applicants must be experienced in the administration and control of a small gas undertaking, and have a sound practical knowledge of the operation of horizontal retorts, distribution practice and office routine.

The salary for the post will be within A.P.T. 4, Provincial 'B' (£320-£510) with placing according to qualifications and experience, plus free house and allowance for fuel and light.

The post is superannuable and the successful candidate may be required to undergo a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should be lodged with the undersigned within fourteen days from the appearance of this notice.

ROBERT FIFE,
Group Manager.

Riverbank Gas Works,
Kilmarnock.
January 19, 1955.

SCOTTISH GAS BOARD

FIFE GROUP
DUNFERMLINE DISTRICT
DISTRIBUTION TECHNICAL ASSISTANT

APPLICATIONS are invited for the position of DISTRIBUTION TECHNICAL ASSISTANT.

Candidates in applying should state Technical qualifications, giving details of previous experience including use of Town Gas for Industrial purposes, the preparation and carrying out of low, medium, and high pressure distribution schemes.

The salary will be on Provincial 'A', Grade VI (£530 to £610).

Candidates who may not have technical qualifications but are qualified draughtsmen might be considered for the position provided they are willing to learn technical distribution practice.

Applications to be sent in to undersigned not later than January 27, 1955, with *copies* of Testimonials or the names of two persons to whom reference can be made.

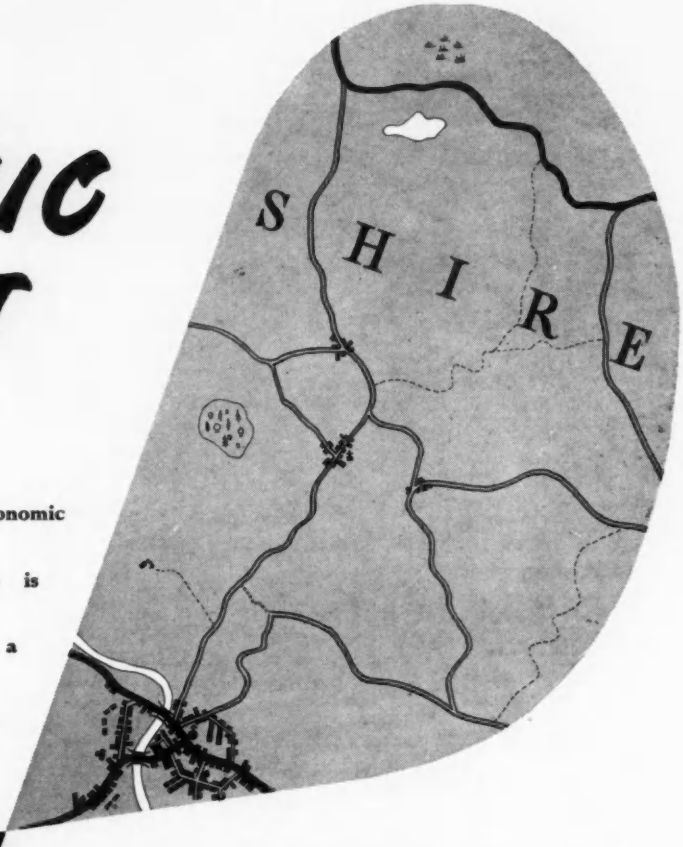
The position is superannuated and the successful candidate will be required to pass a medical examination.

DAVID L. DICKSON,
Group Manager.

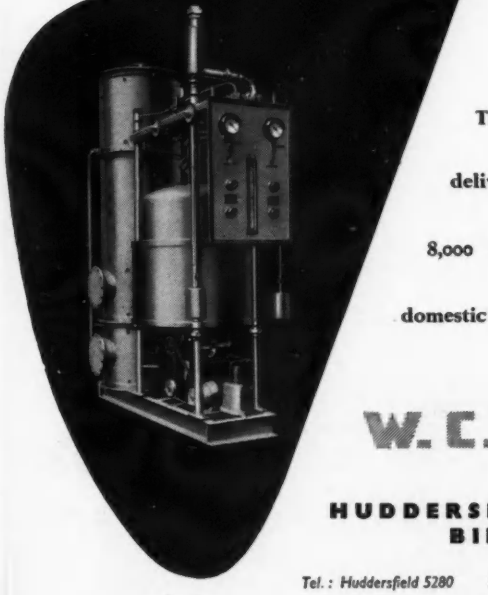
Gas Works,
Grange Road,
Dunfermline.

STRINGER BROTHERS
ALBION WEST BROMWICH
S.B
IRON & STEEL
PLATES &
SHEETS
BARS & SECTIONS
Telephone:
WEST BROMWICH 0436-7

THE ECONOMIC UNIT



The conception of the minimum economic unit of gas manufacture is wider when the source of supply is a Holmes-Mallet Butane air plant.



THE ECONOMIC UNIT

The Holmes-Mallet Butane Air Plant illustrated delivers a butane air mixture up to 8,000 cubic feet per hour which can be used for all domestic and industrial purposes.

W. C. HOLMES & CO. LTD.

HUDDERSFIELD · LONDON
BIRMINGHAM

Tel.: Huddersfield 5280 London: Victoria 9971 Birmingham: Midland 6830

FOUNDED 1850
HOLMES
HUDDERSFIELD

C1811

TYPE 3 MIXTURE CONTROLLER

for accurate control of air blast systems

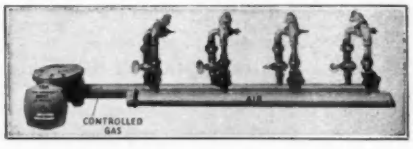
The Type 3 is the latest development in mixture controllers. Its function ensures exact proportioning of air and gas over a wide range of volumes despite the slightest variation of pressures.

Air pressures between ¼ lb. and 1 lb. are used normally but in special instances up to 2 lb. can be used.

Of robust unit construction, the assembly consists of a diaphragm valve, monitor governor and an injector which can be set in any one of four standard positions on site.

The Type 3 mixture controller is available in four sizes 1″, 1¼″, 1½″ and 2″. Write or 'phone now for particulars.

The Type 3 zero governor is a modification of the controller. Providing individual control of burners, it gives greater effective control of heat distribution, facilitates burner ignition and has greater sensitivity and range than previous types.



INDUSTRIAL GAS EQUIPMENT

Keith Blackman Ltd
MILL MEAD ROAD, LONDON, N.17
TEL: TOTTENHAM 4522 (12 LINES)

If air blast arrangements are not already installed a K.B. High Pressure fan will provide, as a rule, greater efficiency and economy than a positive blower or compressor of equal capacity. These fans may be supplied with or without K.B. made motors as required.

601

CENTRAL ACTION DRILL STANDS

Providing the most satisfactory means of drilling and tapping live gas mains, these Stands are suitable for use on cast iron, steel and asbestos cement pipes. Drills and taps are accurately centred in a well supported drill chuck which minimises risk of damage to the drill. To facilitate operation of the ratchet brace the head of the stand is made to swivel.

Illustrated literature on request.

PASS
GAS AND WATER ENGINEERS

Specialists
IN UNDERPRESSURE ENGINEERING

E. PASS & COMPANY LIMITED . DENTON . MANCHESTER . *Telephone: Denton 3001/2/3*

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GLOVER-WEST

CONTINUOUS VERTICAL RETORTS

C.O.L

INTERMITTENT VERTICAL CHAMBERS

WEST'S GAS IMPROVEMENT CO., LTD

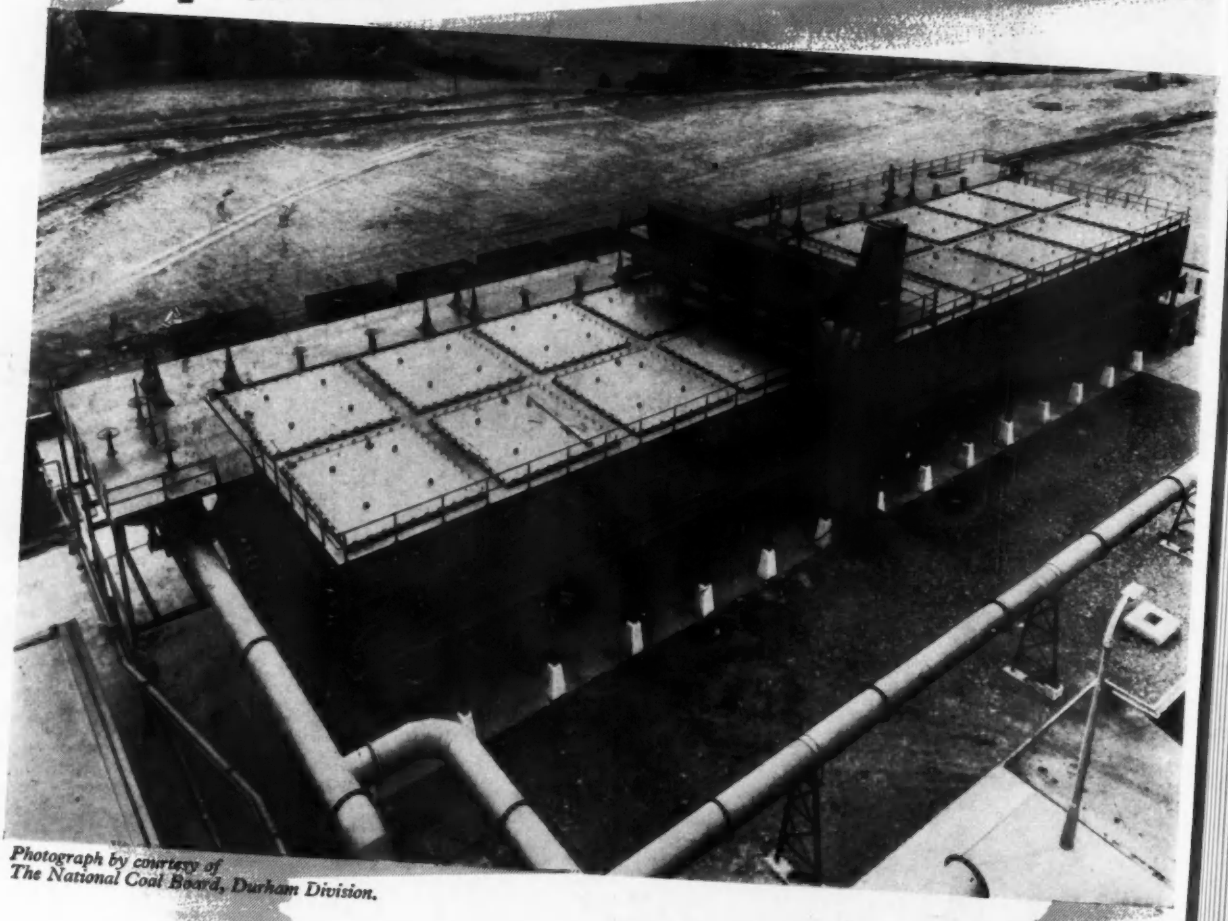
ALBION IRONWORKS · MILES PLATTING · MANCHESTER 10
Telephone: COLlyhurst 2961 Telegrams: Stoker, Manchester

AND IN LONDON

Columbia House, Aldwych, S.W.1. Tel: HOLborn 4108 Grams: Wesgasco, Estrand
C.O.L. Division: Chandos House, Buckingham Gate, S.W.1. Tel: ABBey 6912

GC2

7 MILLION CUBIC FEET PER DAY



Photograph by courtesy of The National Coal Board, Durham Division.

Cast Iron Gas Purifiers

These Purifiers, recently completed for the new Fishburn Coking Plant of the National Coal Board, are another example of a completed Purifier installation by Newton Chambers. May we assist you with your Purification problems?

NEWTON CHAMBERS

& CO. LTD., THORNCLIFFE, Nr. SHEFFIELD